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EDITORIAL

THE REGENERATION OF A GREAT PROFESSION.

Imagine two young people, living in an isolated district where the opportunities for education or self-betterment are very limited, have fallen in love with each other. The young man sees in the girl the exempification of all the virtues of his community; he can see no lack in her education, incomplete as it is, nor does he find fault with her manners, crude though they may be, because he knows nothing better himself. Moved with ambition to improve his condition he goes out into a larger community. An opportunity is grasped to go to college. After four or five years he returns to his native town. The girl who before had seemed to him the paragon of all the graces now appears untutored and awkward; virtuous as she may be she no longer holds any attraction for him.

Analogous to these two lovers is the situation of pharmacy and medicine. A few years ago the druggist and the doctor were on a practical parity as far as education, or rather lack of education, was concerned. Twenty-five years ago any one of ordinary ability with a grammar school education, after three years of study in a medical school, was ready to go out to practice medicine. Educational qualifications of the man who wrote the prescription at that time were practically equivalent to that of the man who compounded the prescription, for the extra year of schooling that the physician received was compensated by the practical experience in the drug store required of the pharmacist. Today the physician must not only be a high school graduate, but also have had one or more years of collegiate education, must have spent four years in the medical school and, in some States, a year of hospital experience before he can be legally licensed to practice his profession. During

the past three decades while the physician has increased by seven years the time of preparation for his life work, the pharmacist has added but two. Is it any wonder that the doctor of today shows a tendency to hold the apothecary in lower esteem than did his father when both professions were equally lacking in their educational qualifications?

The whole community today is more highly educated than it was a generation ago. Illiteracy has practically disappeared, our high schools are taxed to their capacity, and even the colleges are embarrassed in their attempts to find a means of caring for those who are eager for more knowledge. Is it to be marvelled at, that the druggist no longer holds the respect and deference of the community that were his a few years ago?

Many are viewing with alarm today the manifest tendency towards the commercialism of the drug-store. They foresee the degeneration of a dignified profession to a petty business. As a business retail pharmacy can never take high rank, the class of goods that it has for sale are financially piddling; as a profession an exalted position is open, the class of service it has to offer is of paramount dignity.

The history of pharmacy is a noble one. The contributions of the pharmaceutical profession towards the improvement of our therapeutic agents, up until the middle of the last century, were as notable as those made by the medical profession. The names of Scheele, of Sertürner, and of Pelletier stand as high in the scroll of medical fame as any physicians of their day. But the part played by pharmacists of recent years in the epochal developments of Materia Medica has not been nearly so conspicuous.

The reasons that pharmacy in recent years has contributed so little to the advance of medicine, I believe, may all in their last analysis be referred to the insufficiency of pharmaceutical education. In the first place, the investigator who is lacking in thoroughness of training is at a disadvantage which only the most positive genius could struggle against. But more important than even this handicap is the fact that a pharmaceutical career holds little attraction for men of scholarly ambitions. "Birds of a feather flock together"; a young man eager to accomplish something in the scientific world naturally gravitates towards that profession where something is being accomplished.

It seems to me undeniable that pharmacy has fallen from her erstwhile high estate. How is she to regain the respect of the medical world? Certainly not by boasting of past glories or whining over present indignities, but only by "bringing forth fruits meet for repentance." First and foremost, we must cease from holding our profession so cheaply. The world will not respect us until we respect ourselves. Pharmacists must demonstrate their own belief in the dignity of pharmacy by opening her gates only to those who are deserving; in other words there must be an elevation of educational standards and the degree in pharmacy made to stand for something in the intellectual world. To do this it is essential that the schools of pharmacy shall no longer be bound down by financial anxieties. Higher education today is not and cannot be self-supporting. Any institution which looks to the fees of its students as the sole source of revenue unfits itself to compete with "institutions of learning." The temptation, nay the necessity, of lowering the bars to admit all those who have the money to pay, however lacking in mental qualifications, is too strong to be resisted. Either a considerable endowment or the continuing contributions of philanthropic citizens to meet a considerable part of the expense of the college of pharmacy is an absolute *sine qua non.*

Granted this readjustment of our educational requirements, little by little pharmacy will again elevate its position; the higher type and better preparation of the rising generation of pharmacists will gradually make themselves felt in the intellectual world. But the process will evidently be a slow, evolutionary one. Much can be done to hasten the consummation by what we might call artificial stimulation of research. There are still many men in pharmacy qualified by native ability and educational training to make valuable contributions to the good of humanity. Many of these, however, are held down by the routine drudgery of teaching, which they must do to earn their bread and butter, and by the absence of the incentive of a sympathetic atmosphere. I can imagine no more hopeful means of arousing the latent scientific ambitions of pharmacists than the extraordinary vision of President Braisted. His plan of a great institution of therapeutic research offers at once both the opportunity to do something worth while and the stimulation which comes from contact with those who are doing.

It behooves the pharmaceutical profession of the country—not merely the Alumni of the Philadelphia College of Pharmacy, but all those interested in the welfare of their calling—to acclaim their interest and lend their active support to this, the most hopeful, nay the only promising, constructive plan for the regeneration of a great profession.

H. C. W., Jr.

HOSPITAL PHARMACY.

The other day there came to a certain Philadelphia hospital a man of authority whose business it was to make a careful statistical report of the hospital's facilities and personnel. He inquired with great care into the equipment of the institution, making painstaking entries onto a huge ledger page which he had with him. Very little seemed to escape his trained eye. He had made a business of his work and his entries into the record sheet showed that thoroughness was one of his strong points. Operating room service, anæsthetic procedures, ward arrangement, kitchen and diet room equipment, social service department, free clinic features, surgical dispensary equipment, office force, financial and hospital records,—everything passed in parade before his careful scrutiny. The laboratory equipment, number of microscopes, colorimeters, autoclaves, incubators, microtomes and what not, laboratory records and personnel were given detailed consideration, but oddly enough out of his hundreds of questions not a single one was directed towards the hospital pharmacy. We wondered how such a thorough investigator could ever have neglected this important part of the hospital organization, and we sought from him an explanation of this peculiar omission. And strangely enough, he could give no intelligent answer other than to state that the Commissioner, whose agent he was, had never inquired into hospital pharmacy conditions and that he had apparently deemed the matter of insufficient import to merit inquiry and consideration.

This ignoring of a department so fundamentally necessary to the proper conduct of a hospital seems to us very unwise and not at all in keeping with modern ideas of service. It may be true to some extent that therapeutic nihilism is the order of the day,

but internists and surgeons alike still depend upon therapeutic agents to perform specific duties and to relieve their patients of discomfort or pain. The surgeon's or the internist's responsibility, insofar as the therapeutic agents are concerned, ends with annotating upon the patient's chart the medicament desired.

But who is to superintend the furtherance of the remedy? Who is to see that the proper dose of the correct and standardized drug is furnished to the patient? The surgeon orders his patient an intravenous injection of bicarbonate of soda or irrigation of a wound with Dakin Solution—and he expects that his patient's welfare is impeccably cared for by having these solutions properly prepared. There is much at stake. It may spell life or it may spell death for the patient. To whom does the hospital look for the exact manipulation of these agents? Is the man who prepares these vital remedies equipped for his work? Oddly enough this most important phase of medical service is greatly overlooked and disregarded, and particularly so by the organizations which prescribe specifications for hospital management and service.

Would not a tentative list of questions such as we are submitting here aid in diagnosing the value of the hospital pharmacy service and also help in elevating the standards of the profession in that important phase of its activities?

QUESTIONNAIRE.

A. *Outline of Pharmacy Staff, With Particular Reference to the Following Data:*

Is the chief pharmacist a college graduate, and a registered pharmacist in the resident State?

Are the assistants State qualified?

What are the hours of service in the pharmacy?

What laboratory assistance can the pharmacy furnish? (Very frequently the pharmacist is well equipped to assist in important laboratory service for he may be a trained chemist or bacteriologist.)

Who has direct charge of the narcotic supplies and are the narcotic records carefully kept?

Who has direct charge of the alcohol and alcoholic liquid supplies and are these records carefully kept?

Who is the purchasing agent for the pharmacy supplies? Are they economically and carefully purchased? Is quality or cheapness the basis of purchase? (Unfortunately the condition exists where an intimate knowledge of drug valuation is not possessed by the buyer, frequently the superintendent or medical director.)

Is the pharmacy self-supporting?

B. *Specific Questions:*

Do you manufacture your own tablets, ointments, pastes, galenicals, ampules, etc.?

Are you equipped to standardize, by assay or otherwise, your fluidextracts and tinctures?

Have you a system whereby antiquated and therefore inert preparations are regularly discarded?

Do you manufacture and standardize your own Dakin's Solution?

Are you equipped to prepare the various intravenous medications, 606, neoarsphenamine, etc.?

Are the biological supplies properly refrigerated?

Have you an assembled collection of poison antidotes ready for emergencies?

It is understood that this list is but tentative and open to a good deal of correction. But it is a step in the right direction and hospital pharmacy should not be conducted in the haphazard way which we know is the *modus operandi* of that important department in many of the small institutions, where engagement of a trained pharmacist is deemed unnecessary.

I. G.

ORIGINAL PAPERS

THE FOODS OF THE NEXT CENTURY.*

By CHARLES H. LAWALL, Ph. M., Sc.D.
(Dean of the Philadelphia College of Pharmacy and Science.)

"Methuselah ate what he found on his plate
And never, as people do now,
Did he note the amount of the calorie count—
He ate it because it was chow.
He wasn't disturbed, as at dinner he sat
Destroying a roast or a pie,
To think it was lacking in granular fat
Or a couple of vitamines shy.
He cheerfully chewed every species of food,
Untroubled by worries or fears
Lest his health might be hurt by some fancy dessert,
And he lived over nine hundred years!"

Speculating as to future possibilities is a fascinating pastime, and may not be altogether without benefit, even though we cannot live long enough to learn whether our opinions are true or false. There are calorie cranks who would have us believe that the food of the future will be apportioned out on a scientific-mathematical basis, and that when one enters a restaurant he will be weighed, a food ticket handed him calling for the nutriment indicated by his condition rather than his appetite, and that every human being will be scientifically fed according to the laws of dietetics as laid down by laboratory workers.

There are vitamine vigilantes who are so thoroughly imbued with the fact that in these newly discovered food accessories will be found the cure for all ills of mankind, that they insist upon everybody loading up with vitamine concentrations, entirely ignoring the well-established scientific law that even things that are beneficial have a tolerance limit.

There are imaginative individuals who are frequently quoted to the effect that in the future all foods will be synthetic and of high potency, so that the swallowing of a tablet or two will save the time now devoted to dining. Some of these dreamers even speak of

*One of a series of Popular Lectures delivered at the Philadelphia College of Pharmacy and Science.

synthetic eggs, vegetables and roasts, but while we admit the possibility of synthesizing the basic carbohydrates, proteins and fats which give nutritive value to animal and vegetable foods, there will always be something lacking until the mystery of the living cell itself is solved, for the further our food is from life, the greater the chance of development of one of the so-called deficiency diseases.

This evening's talk on the foods of the next century will not be a discourse on calories nor on vitamines. I am strongly of the opinion that when people eat plenty of food of wide variety there is little fear of malnutrition or of deficiency diseases. My plea therefore will be for catholicity in foods. My creed is that he who can eat in all languages has found nutritional salvation. The individual who can eat and enjoy *schnitz und knoepf,* pate de foie gras, spaghetti, scrapple, koumyss, curry, raw shellfish, roast beef, two-handed cheese (the kind you eat with one hand and hold your nose with the other), chile con carne, tortillas, caviar, chop suey, schwarzbrod, oatmeal, hassenpfeffer, goulash, gefüllte fish, rice, terrapin and *poi,* will never go hungry no matter where he may travel.

Such a person can even be expected to eat (if occasion requires) such unusual possibilities as snails, muskrats, horse meat and skate, all of which are in good standing in certain communities.

I therefore intend to make a general survey of the foods which have been used in the past, the foods which are being used in the present, and the foods which likely will be used in the future, in the hope that a wider knowledge of food possibilities may lead to further gastronomic experimentation on the part of some who have heretofore been ignorant or prejudiced.

One way to anticipate the progress of the future is to study the history of the past. In some fields of speculation this will apply with greater force than in others. For example, who could have foreseen, twenty-five years ago the radical changes that would take place in transportation methods made possible by the automobile and the airplane?

With speculation in regard to foods, however, it is different, for there is a limited range of possibilities involved and the imperative needs of the human animal have been so thoroughly and scientifically studied that it has narrowed down to a few well-defined alternatives. Let us first study the past, therefore, and see what data can be assembled for use in prognosticating the future.

The importance of food to human welfare is paramount, water and air being the only other factors which affect one hundred per cent. of the population one hundred per cent. of the time. J. Russell Smith says in his introduction to "The World's Food Resources":

"Did you ever figure out just what you would do if your food supply failed? You probably have not, but a good observer who has seen men in all stages of starvation in the Yukon wilderness, has it worked out in this way: 'If a man misses his meals one day, he will lie. If he misses his meals two days, he will steal. If he misses his meals three days, he will kill.'"

Statistical figures of food consumption by countries show wide variations. The inhabitants of the United States are the greatest consumers of food in the world today, with a record of 2664 pounds of food per year per capita. The Japanese hold the low record with 980 pounds of food per year per capita.

FOODS OF THE REMOTE PAST.

During the half million or more years that man or a semi-simian ancestor is known to have inhabited the earth, he has left certain records which have been fairly continuous and more or less certain only during the past five or six thousand years. From the time of *Pithecanthropus Erectus,* passing through the periods of *Homo Heidelbergensis, Eoanthropus, Homo Neanderthalensis,* the *Cro-Magnards,* and the *Grimaldi,* down to the *Neolithic man* of ten or twelve thousand years ago, each succeeding race must have consumed food.

In Wells' "Outline of History" the author quotes Mr. Worthington Smith upon this subject as follows: "Primeval man is commonly described as a hunter of the great hairy mammoth, of the bear and the lion, but it is in the highest degree improbable that the human savage ever hunted animals much larger than the hare, the rabbit and the rat. Man was probably the hunted rather than the hunter. The primeval savage was both herbivorous and carnivorous. He had for food hazel nuts, beech nuts, sweet chestnuts, earth nuts and acorns. He had crab apples, wild pears, wild cherries, wild gooseberries, bullaces, sorbs, sloes, blackberries, yewberries, hips and haws, water cress, fungi, the larger and softer leaf buds, nostoc (the vegetable substance called 'fallen stars' by country folk), the fleshy, asparagus-like rhizomes or subterrannean stems of the Labiatæ and like plants, as well as other delicacies of the vegetable kingdom.

"He had birds' eggs, young birds, and the honey and honeycomb of wild bees. He had newts and snails and frogs. He had fish and fresh water mussels. By the seaside he would have fish, molluscs and seaweed. He would have many of the larger birds and smaller mammals which he could easily secure by throwing stones and sticks or by setting simple snares. He would have the snake, the slow worm and the crayfish. He would have various grubs and insects, the larger larvæ of beetles and many caterpillars. A chief and nourishing object of food would doubtless be bones smashed up into a stiff and gritty paste. A fact of great importance is this—primeval man would not be particular about having his flesh food over fresh. He would constantly find it in a dead state, and, if semi-putrid, he would relish it none the less, for the taste for 'high' or half putrid game still survives."

Speculation again, you say? Not altogether, for evidences of the use of some of these foods have been found in the debris of caves, or of the long-submerged habitations of the lake dwellers or of the kitchen middens of paleolithic or neolithic man.

FOODS OF BIBLICAL TIMES.

An interesting source of information regarding foods is found in the Bible whose chronology covers nearly six thousand years and carries us to a point slightly beyond the dawn of the Christian era.

The foods mentioned throughout the Bible are the earliest to be recorded in literature by civilized man. The first mention of food in the book is in Genesis I, 29: "And God said, Behold I have given you every herb bearing seed which is upon the face of all the earth, and every tree in the which is the fruit of a tree yielding seed; to you it shall be for meat."

That man's existence in the Garden of Eden was to have been as a vegetarian, as indicated by the foregoing, is confirmed by the next reference to food in Genesis II, 16, 17: "Of every tree of the garden thou may'st freely eat, but of the tree of the knowledge of good and evil, thou shalt not eat of it."

No reference to flesh foods is directly made until some time after the expulsion from the garden, although one wonders what became of the flesh of the animals from which were taken the skins used for clothing (Gen. III, 21).

The first direct reference to the slaughter of animals is in connection with Abel's offering (Gen. IV, 4).

The next reference to food is in Genesis VI, 21, and is also a general reference, naming no specific food: "And take thou unto thee of all food that is eaten, and thou shalt gather it to thee and it shall be for food for thee and for them."

It is hardly possible that no flesh foods were eaten at this period for Abel had already been described as a "keeper of sheep." and it is hardly likely that he kept them for ornamental purposes. It is not until after the flood, however, that express permission is given to consume flesh food, in Genesis IX, 3: "Every moving thing that liveth shall be meat for you; even as the green herb have I given you all things. But flesh with the life thereof, which is the blood thereof shall ye not eat."

It is curious that prior to the mention of any specific food in the Bible, excepting the apple, reference is made to wine in the incident of Noah and the product of the vineyard.

The first mention of foods by name begins in Genesis XIV, 18, where "Melchizedek, King of Salem, brought forth bread and wine for Abram." The first mention of flesh food is a little later on when Abraham "fetched a calf, tender and good." In connection with this same meal are mentioned fine meal, cakes, butter and milk.

Other foods mentioned in Genesis, in the order of their appearance are lentils, the meat of young goats, venison, corn (used in the generic sense to denote grain), wheat, mandrakes, oil (undoubtedly olive oil), grapes, bake meats, honey, nuts, almonds and spices.

Additional foods mentioned elsewhere throughout the Bible are barley, beans, citron, cucumber, figs, fishes, garlic, hazel nuts, herbs, husks, leeks, locusts, melons, millet, mulberries, nuts, olives, onions, pomegranates, quails and rye.

The corn of the Bible was either millet, wheat, or spelt (rye), never maize, which was not then known in the eastern hemisphere. The apple was probably the apricot. The husks were St. John's bread. Nuts were walnuts or pistache nuts. Herbs included lettuce, endive, chicory and mint. Spices were anise, cassia, cinnamon, coriander, cumin, dill, hyssop, mustard, rue and saffron.

Eating and drinking were looked upon as important functions and our expressions regarding "the fat of the land" and "the good things of Egypt" are of Biblical origin.

The early peoples of all lands were great consumers of the edible game which abounded in the forests and of the fish which inhabited the streams. Among many early races and continuing up even to medieval times, there was a common soup pot or family dish, in which the whole meal appeared. This is undoubtedly the origin of the term "pot luck," still prevalent with us.

China had possessed for thousands of years a flourishing agriculture and horticulture at the beginning of the Christian era, but we are just beginning to realize the possibilities of that country through the work of the Bureau of Plant Industry of the U. S. Department of Agriculture, of which more will be said later.

Their records show that over 2000 years ago one of their ambassador explorers brought back from western Asia the bean, the lucern, the saffron, the sesame, the walnut, pea, spinach and the watermelon, all of which had hitherto been unknown to the Chinese. China, in return, gave to the world the peach and the apricot, both of which are sometimes erroneously credited to Persia, and also a number of the citrus fruits.

The early civilizations of the American continent had carried agriculture to a high degree of perfection and the contributions of the new world to the list of news foods are second to none in importance, as will be seen later.

FOODS OF LATER PERIODS.

Feasts and banquets in past ages seemed to have called forth more food varieties than do similar events today, for we hear of larks' tongues, of pheasants drenched with ambergris and of pies of carps' tongues. During the period of the Renaissance the banquet came to be more luxurious and expensive than ever. There were often principal dishes called "subtleties" in the nature of a surprise, such as a cooked pelican sitting on the nest with its young, or a whole peacock in full panoply, the skin and tail being replaced after the fowl was cooked. In 1466, upon the occasion of the enthronement of Archbishop Neville, it is said that at the banquet which followed there were 104 peacocks served in this manner.

Whale meat was often found on royal tables in the fifteenth century. Porpoises and grampuses were served whole.

Meats of this period in Great Britain included fowl, pork, beef, mutton and veal.

The fish of this period are enumerated and described with great particularity by Izaak Walton.

Beer or wine was an indispensable part of the English menu in the eighteenth century. Oysters and wine were considered the proper thing for breakfast.

Sweets and conserves, including sugar, were first used in the Orient and spread through Italy to the remainder of Europe. They were first sold exclusively by the apothecaries, who also had complete control of the retailing of spices.

The culinary art or the cooking of foods is a complete subject in itself, which has its own literature and its separate historians. In feudal times and until later, the large households required quantities which would stagger the housewife of today. From one of the cook books called a "Booke of Simples," which dates from the early part of the eighteenth century, are quoted the following:

A cake calling for a quarter peck of flour.

A beverage (metheglin) made from twelve quarts of honey and twelve gallons of water.

A rump of beef, baked.

A bread baking, starting with a peck of flour.

A barrel of oysters made into an oyster stew.

A milk punch made from 5 quarts of brandy, 8 quarts of water, 2 quarts of milk, 4 dozen lemons, 3 nutmegs and 1½ pounds of sugar.

New foods undoubtedly were making their appearance during this period. In a cooks' and confectioners' dictionary (1723) by John Nott, asparagus and spinach are mentioned for the first time in the culinary literature, although both had been cultivated for centuries in some localities.

The discovery of America brought a number of important new foods, some of which took several centuries to introduce, but which now form important staple foods for millions of people. The more important of these are the potato, sweet potato, maize, tomato and chocolate. Explorers and colonizers from time immemorial have been responsible for the introduction and cultivation of new foods.

The most comprehensive survey of the origin of foods was undoubtedly that of De Candolle, who in his classic work on "The Origin of Cultivated Plants" (1882) names the following vegetable foods which have been cultivated for more than 2000 years, and also gives the country of their origin.

Asia.—Radish, garlic, onion, taro, yam, garden cress, tea, sugar cane, grape fruit, lemon, orange, tangarine, grape, mango, plum apricot, peach, quince, pomegranate, cucumber, olive, egg plant, banana, bean, pea, soy, pistache, buckwheat, barley, millet, rice, sesame, black pepper, coconut.

Europe.—Horseradish, turnip, carrot, cabbage, asparagus, pear, apple, lentil, spelt (rye), oats, walnut.

Africa.—Watermelon, date, sorghum, coffee.

Mediterranean Basin.—Beet, celery, lettuce, leek, grape, cherry, almond, fig, chestnut, mustard.

America.—Jerusalem artichoke, potato, sweet potato, manioc (tapioca), arrowroot, maté, vanilla, guava, pumpkin, squash, prickly pear, persimmon, capsicum, tomato, avocado, paw-paw, pineapple, chocolate, maize, quinoa, peanut, lima bean.

In the list of vegetable foods which he states are of comparatively recent origin as regards cultivation are parsnip, salsify, spinach, parsley, artichoke (flower heads), chicory, endive, okra, raspberry, strawberry, gooseberry, currant, muskmelon.

From this survey it will be seen that our great variety of the present, as compared with the past, is due to improved methods of cultivation and transportation. J. Russell Smith says: "The Great War with its starvation made nations see, really see, what a century of world trade had done for them by giving them the whole world from which to feed themselves. In the matter of food supply there has been far more change since the days of George Washington than there was in all the time between George Washington and Caesar, or Nebuchadnezzar, or Cheops, who built the pyramids of Egypt."

"In 1786 a Massachusetts farmer wrote a pamphlet telling just how he supported his family. With the wheat and corn and buckwheat that grew in his fields he furnished the family bread. The chickens, pigs, sheep and occasional beef that he slaughtered fur-

nished the meat. His garden furnished all the vegetables and his orchards all the fruits, many of which, along with garden vegetables, were dried for winter use. Thus the farm produced the family food. For clothing his wife spun the wool which he sheared from the sheep; and the flax that grew in a corner of the field was made into linen. The skin of the meat animals was tanned and made into shoes and thus they were clothed. The trees from his wood lot furnished the boards to build his house and the logs for his fire and the rails for such fences as were not made of stone. He himself, like most farmers of that time, was a fairly good worker in wood and had a little blacksmith shop, so that he made practically all of his own tools on rainy days and in snowy winter weather. Only a few things were needed from the outside world, such as salt, pepper, a little lead and gunpowder, and iron for his little forge. These outside products cost him altogether $10 a year, permitting him to save $150 out of the $160 received for the wheat and cattle that he sold."

Newspaper advertisements of a hundred years ago throw additional and interesting light upon conditions existing then. Among the auction and market offerings in a Philadelphia daily newspaper of 1822 are mentioned the following foods: St. Domingo coffee, mackerel, Spanish chocolate, salt pork, sweet oil, New Orleans, Havana, Batavia and Muscovado sugars, nutmegs, mace, cinnamon, lemons, pecan nuts, flour, rice, barley, oats, beans, peas, almonds, cheese, starch, raisins, hams, dried peaches, onions, codfish, shad, honey, molasses and tea. These, it will be seen, are staples, and no perishable foods are mentioned in any of the advertisements of that period, which I have been able to find.

In a paper of the same period an advertisement of a then prominent restaurant promised its patrons that mush and milk would be served upon certain evenings.

There were few or no manufactured foods at that period. Food canning, which began during Napoleon's reign, through the invention of this process of Nicholas Appert, had not established itself as a commercial possibility.

During the past seventy-five years more changes have occurred in food habits, food preparation, food distribution and food selling, than had taken place in many previous centuries. The first great epoch was that in which occurred the development of manufactured

and package foods. During the early part of this period there was much indifference to the welfare of the consumer shown by the manufacturer. Adulterations were common and exaggeration of value was prevalent. Working upon the old principle of *caveat emptor,* the attitude of the manufacturer was selfish to an extreme degree. The passage of State and finally of national food laws, coupled with the scientific investigations of many individuals and organizations, has brought about great improvement in this direction. The results of study and experiment upon calorific values, protein ratios, the necessity of certain mineral constituents, the indispensability of certain food accessories or food hormones, known as vitamines, is now common knowledge to the well-informed individual.

It is a strange but true fact that with all of our improvements in the distribution of foods and the wider range that is offered for selection, some of our most important staples, such as wheat, flour, cane sugar, etc., have been so debased by the removal of certain valuable elements in order to satisfy the inexplicable demand for whiteness, that the individual who eats freely of them must supply the lacking elements by the use of other foods in which they are contained, or must suffer in consequence. The failure of our Government to properly protect the health of its citizens by prohibiting the unnecessary sulphuring of dried fruits, is another of the discouraging features of the present with regard to foods.

IMPROVED TRANSPORTATION METHODS OF THE RECENT PAST.

The great triumph of the recent past has been in so improving methods of transportation that products from far distant lands can be brought to metropolitan markets in a condition approaching perfection of quality. This has resulted in diminishing the seasonal scarcity of many perishable fruits and vegetables and also tends to equalize prices throughout the year.

Shell eggs have been successfully transported from China to the eastern part of the United States under conditions so perfect that they are almost equal to nearby fresh eggs. Soft fruits, such as peaches and plums, are shipped from South Africa during the winter months and appear in the windows of the fancy fruit stores frequently, in New York and Philadelphia. Melons, grapes, cherries, peaches and pears have also appeared during the past winter from Chile, Argentina and other South American countries. The South

American fruits have not been as well packed as the South African fruits, and do not reach our markets in as good condition as do the latter, although the South American fruit reaches us in fifteen days while the South African fruits require over a month. By another winter, when the South American shippers have learned to pack their products properly, it is likely that practically all fresh fruits will be obtainable every month in the year for those who can afford or are willing to pay the price.

Strawberries are now obtainable in any large city practically throughout the whole year, from our own country. In illustration as to what transportation has accomplished and in sharp contrast to the experience of the Massachusetts farmer previously referred to, J. Russell Smith says: "The man of today starts his breakfast with an orange from California or Florida, or a banana from Central America, or an apple from Oregon, Virginia or New York. He takes a shredded wheat biscuit made in Niagara Falls from Dakota wheat. He sugars it with the product of Cuban cane. He puts Wisconsin butter or bread baked of Minneapolis wheat flour mixed with Illinois corn flour (this was during the war). He has a potato. In June it comes from Virginia, in July from New Jersey, in November from New York, Maine or Michigan. If he indulges in meat, it is a lamb chop from a frisky little beast born on the high plains near the Rocky Mountains and fattened in an Illinois feed lot before going up to Chicago to be inspected, slaughtered and refrigerated. He warms and wakes himself up with a cup of coffee from Brazil (called Mocha perhaps), or tea from Ceylon or Japan, or cocoa from Ecuador or the coast of Guinea." Dr. Smith might have added that he seasons his food with salt from Michigan, West Virginia or New York, and pepper from Singapore.

CHANGES TO BE EXPECTED IN THE FUTURE.

What is to be the development in the future? What can we expect one hundred years from now, assuming that our civilization does not collapse before then from its intolerable complexity? I think we may safely assume the following lines of development as certain to occur:

1. Still further improvements in transportation.

2. Improvements in present foods by development of new and valuable varieties.

3. Increase in crop yields, insuring more abundant and possibly cheaper foods.

4. The development of more scientific and economical methods of food conservation.

5. A wider distribution of useful foods of other countries.

6. The education of the consumer to overcome bad food habits and prejudices.

In looking forward to improvements in transportation we may assume that developments will be made along the line of perfecting refrigerating cars as well as cutting down the time of transportation between distant points. Great aerial fast freights may in future days link transoceanic continents with the speed and certainty that now connect outlying market gardens with any large city.

Improvements in varieties are constantly occurring, usually by design and occasionally by accident. The Concord grape, the Newtown Pippin apple and the Rome Beauty apple are outstanding examples of fortuitous occurrence. Only recently a monument was unveiled in Procterville, Lawrence Co., Ohio, by the Ohio State Horticultural Society to commemorate the origin of the Rome Beauty apple, which was accidently developed by a boy who planted a twig thrown away by his father at grafting time.

The Newtown Pippin is a pre-revolutionary apple, developed from a seedling discovered near Newtown, N. Y., and sent to Benjamin Franklin, who was instrumental in its propagation and dissemination.

The original Concord grape vine is still exhibited to tourists who visit Concord, Mass. Many excellent new varieties of foods are developed by scientific methods of study and propagation, and the name of Luther Burbank in this connection has become almost a household word, although credit must not be withheld from commercial seed houses and nurserymen.

The work of the Bureau of Plant Industry of the U. S. Department of Agriculture is also a great factor in this direction, for in addition to bringing in fruits, vegetables and nuts which are entirely new, the Bureau brings in varieties of existing food plants for the purpose of conducting hybridization and breeding experiments with the view of developing new qualities or disease-resisting properties. The office of Foreign Seed and Plant Introduction of this Bureau

maintains a number of field stations or experimental gardens. They are located at Miami and Brooksville, Florida; Chico, California; Bellingham, Washington, and Yarrow, near Rockville, Maryland. These stations cover a geographic and climatic range which make it possible to test plant and seed introductions from almost every clime.

From these experimental gardens the new plant material is distributed to State experiment stations and to private experimenters who are anxious to co-operate in this world-wide search for new and valuable foods.

The possibilities of increase in crop yields are being stimulated at present by agricultural organizations all over the land. Prizes are offered for authenticated record crops and particularly to young people, the awards being made at county or community exhibitions under the auspices of the grange or other similar body. We have much to learn from European farmers in this connection, and the older civilizations of Asia are far ahead of us in this phase of agriculture.

The development of scientific methods of food conservation and preservation has its greatest opportunity for the future in dehydration. This has already been thoroughly covered by Dr. Heber W. Youngken in a previous lecture of this course (*A. J. P.*, 1922, p. 4), but it may not be amiss to refer briefly to the outstanding advantages.

Dr. David Fairchild, in the *Geographic Magazine,* for April, 1918, very emphatically makes the contrast as follows:

"Fifty years ago we refused to eat the tomato because we believed it was poisonous; then we became so fond of it that we demanded it both in and out of season, even though it had to be grown thousands of miles from our markets, in the South or under glass. And for our Epicurean tastes we paid exorbitant prices. Then we learned to can this vegetable in great factories, and because we want our tomatoes stewed instead of as a sauce for macaroni or rice, we insist that the vast majority of our put-up product shall be in form for our immediate use—emergency ration shape; in other words, canned without being concentrated into paste, which is the way in which the Italians use their tomato flavor. In this dilute form 360 million cans of tomatoes are shipped over the country.

"There are two pounds and one ounce of tomatoes in a can, or a trifle over 1.8 cents' worth, and in a case of twenty-four cans, which sells for $4 (this was during the war), approximately 43 cents' worth of tomatoes as picked in the field. This not only means that we

ship the tin cans in which the tomatoes are contained, but that we first ship the same number of tin cans from the factory where they are made to the cannery where they are filled.

"We have never learned and have never had to learn, until war's necessities forced the matter to our attention, that the tomato can be successfully sliced and dried; that it retains its characteristic flavor and aroma when so dried; that when soaked in water for four or six hours it comes back and makes a delicious sauce or soup, slightly sweeter than the canned tomato. For many ordinary uses of the household the dried tomato is as satisfactory as the canned product.

"One ton of good tomatoes, after peeling, trimming and packing in cans will weigh approximately 2300 pounds, when crated for shipment, whereas the same quantity, when dried and boxed is reduced to only 200 pounds, or about one-twelfth as much. In bulk the saving depends upon whether the slices are compressed or not. If left loose in the packages, the equivalent of ten carloads of the canned tomatoes could be packed in a single car, and when the car space required for moving the empty cans, block tin and packing case materials is considered, this number of cars is practically doubled."

In the case of spinach the contrast is even greater, for one pound of dehydrated spinach replaces a 60-pound case of canned spinach. In the case of dehydrated cabbage, it was found by actual test in an army camp, that five pounds of dehydrated cabbage, when soaked and prepared for the table by cooking, provided a serving each for more than 400 men.

So much for that phase of economy, which is convincing in itself. If it is true, as stated by a high official in the United States Food Administration, during the war, that "one-half of all the fruits and vegetables in the United States never reach the consumer," and that this terrible loss is due to careless and unscientific methods of handling, it would seem that dehydration would again be the answer.

If in every community where perishable foods are raised, a dehydration plant could be established, those portions of the crop that under ordinary conditions now go to waste could be dehydrated and thus quickly placed beyond the possibility of spoilage. This would increase the amount of available food and undoubtedly reduce prices.

At first glance, it would seem that such a development would be taking place even at the present time, but there are several factors working against this. First and foremost among these is the

opposition to, or rather apathy, regarding dehydrated foods on the part of the consumer. Many of them require a little more time to prepare an account of the necessity of restoring them by preliminary soaking, and this extra trouble counts heavily against a new product, no matter what its obvious advantages.

Then, considering the fact that eventually dehydrated foods will replace the more expensive canned foods, all of which are put up at present by private capital, it must be expected that opposition will develop in this direction.

Another bar to the progress of dehydrated foods is found in the fact that all are not equally good as now found upon the market and much harm can be done to the development of a new field of this kind by the sending out of products not representative of the highest state of the art. Indeed, our own Department of Agriculture, through its Bureau of Chemistry has done harm to the dehydrated food industry by distributing products of inferior quality and appearance as representative samples of what could be done in this connection.

There are a number of firms, mainly in the West, that are now putting out dehydrated foods of fairly good quality. The finest products I have ever seen have been prepared by a patented process, called the Cooke-Kelly Process, originated by Dr. J. F. Kelly, of Pittsfield, Mass., whose products are available by parcel post to those who wish to purchase. These do not require any soaking previous to cooking.

When these vegetables and fruits are restored, they are undistinguishable from the fresh fruits or vegetables by any tests, chemical, microscopical or organoleptic.

Under the heading of a wider distribution of useful plants, we are impressed by the fact that when we find anything in the food line that is new to us as individuals and take the trouble to investigate it more fully, we always discover that there is some part of the world where it is in common use or has been under cultivation. De Candolle says:

"Men have not discovered and cultivated within the last two thousand years a single species which can rival maize, rice, the sweet potato, the potato, the bread fruit, the date, the millet, cereals, sorghums, the banana or soy. These date from three, four or five thousand years, perhaps even in some cases, six thousand years."

The progress of the future, therefore, in its line, will be the introduction of food-yielding plants from foreign lands and the education of the food-consuming public to the use of the new foods thus made available. The most valuable factor in this connection in our own country is the work of the Bureau of Plant Industry of the U. S. Department of Agriculture. Under the administrative leadership of Dr. David Fairchild, Chief of the Bureau, there are sent to foreign lands experienced individuals called "agricultural explorers," who bring or sent back many entirely new foods, besides many new varieties of foods already in successful cultivation in America.

Among the new foods and new varieties which have been thus introduced are many which are enumerated in an article published by the author in 1918, entitled "Some New and Interesting Vegetable Foods and Fruits" (A. J. P., 1918, p. 170), which was abstracted from a lecture delivered before the Wagner Free Institute of Science. The more important of these which have already obtained a foothold are the avocado, the chayote, Chinese cabbage, dasheen, loganberry, soy, and the honeydew and casaba melons. Among the possibilities for the near future are the following:

The Colombian Berry, or Giant Blackberry of Colombia. This is a berry which grows abundantly in the wild state in the Colombian Andes and has never been brought under cultivation. The fruits are enormous as compared with our cultivated blackberries, the largest specimens described by Mr. Wilson Popenoe, the agricultural explorer, who studied the plant in its native home, measuring 2¼ inches long by 1½ inches in breadth. Plants and seeds have been introduced into the experimental gardens of the Bureau, and the development of this new plant will be observed with interest.

The Mango, which has been called the King of Fruits in Cuba, is another fruit which is being experimented with in this country, especially in Florida. Mr. Popenoe, who is in the investigator in charge of this fruit also, says that the real, luscious, enjoyable, edible mango has not yet appeared in our northern markets and that the stringy, insipid fruits of that name sold by the fancy fruiterers are not fair to the mango as known in its native clime.

The Pejibaye or *Chondaturo* is a tropical American counterpart of the Oriental date palm. It is cultivated in Costa Rica, Colombia,

Venezuela and Ecuador, and furnishes a staple foodstuff of numerous aboriginal tribes. While it is the fruit of a palm it is not sweet, but resembles the chestnut in flavor and character, and like it, is boiled in salted water previous to eating. This is one of the new foods that would have to be shipped to, rather than grown in this country, as attempts to cultivate it in Florida have not been successful thus far. The yield of the fruit is about 100 pounds per tree per year, which makes it a very valuable crop as the food value is very high. The calorific value is nearly equal to that of the avocado and more than double that of the banana.

The Pistache Nut is one of the introductions from China which seems to be obtaining a foothold in the west, being successfully grown in the Sacramento and San Joaquin valleys in California. At present all supplies of pistache nuts come from abroad, but those who have studied the subject and are familiar with conditions believe that the pistache culture will be of considerable importance in this country in the near future.

The Chinese Persimmon or Kaki is now being successfully grown in California and the South. The culture of this fruit is destined sooner or later to develop into an important industry. Dried persimmons form a staple food product of China and Japan.

The Jujube, from China, is another promising plant immigrant for the semi-arid South and Southwest. The tree bears a juicy fruit about the size of a plum, of a reddish or mahogany brown color when ripe. It is a good edible fruit when fresh, but when processed with cane sugar and dried it compares favorably with the date in flavor and nutritive value, and will undoubtedly have a large sale when supplies become available.

The Tangelo, which is a cross between a tangerine and a grape fruit (pomelo) has already made its appearance at some of the fruiterers, and may win a place for itself among lovers of citrus fruits in spite of its numerous seeds.

The Jaboticaba is a Brazilian fruit which is distinctive and peculiar in that the blossoms and fruit are produced directly on the trunk and main branches of the trees. The fruit is about an inch in diameter and consists of a mass of white, translucent, juicy pulp

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surrounding a few oval seeds, enclosed in a tough skin, and with a flavor similar to that of certain varieties of the grape.

The Passion Fruit is another new fruit which has acclimated itself in some parts of the South. It is eaten out of hand and also made into jelly.

The Chilean Strawberry is a variety of that fruit which may have great possibilities in hybridizing, for it stands transportation well and has remarkable keeping qualities.

The Feijoa or pineapple guava is a South American fruit now grown in California which is described as having the refreshing taste of the pineapple, the richness of the avocado and the pungency of the strawberry with a tang of sassafras.

The Yam is a large tuber widely known and used in the West Indies and now successfully grown in Florida. It affords a change from the potato, which it somewhat resembles.

The Taro or *Dasheen,* which has already obtained a foothold in the South and some of the large cities of the North, is appearing in other varieties than the one originally introduced. The latest or Penang Taro, is almost like chestnuts in flavor when baked, and is excellent when French fried. Mr. R. A. Young, the plant introducer in charge of the Dasheen or Taro, says that there are many varieties of the Taro differing slightly in flavor or eating quality, just as do different varieties of apples.

The Udo, a popular Japanese vegetable, much used in salads, can be successfully grown in the eastern United States, north of South Carolina, and will become very popular when supplies are available.

The Sapote is a Central American fruit which grows well in Florida. It is the size of an orange and has yellowish flesh of soft melting texture.

The Roselle is a species of Hibiscus widely cultivated in the tropics and now grown in Southern Florida and Southern California for the fleshy calices which are used in jelly-making and for preparing a refreshing acidulous beverage.

The Cherimoya is a delicious tropical dessert fruit, which sometimes weighs several pounds and contains of a white soft pulp of a sub-acid, delicate flavor. It can be successfully cultivated in California.

The Sugar Apple is similar to the Cherimoya.

The Lingonberry is a close relative of the cranberry which is being brought in from Nova Scotia and Scandinavian Europe for use in jelly-making.

The education of the consumer in overcoming bad food habits and prejudices, is probably the greatest need of the present and one of the greatest hopes of the future. Few individuals can enjoy a wide range of variety of food. Prejudices regarding foods are stronger than any other, save perhaps religion. Whole peoples will go hungry rather than eat food to which they have not been accustomed.

David Fairchild says, in the article previously quoted: "The problem of feeding the Allies met with the stumbling block of unfamiliarity and prejudice. French and Belgians simply could not and would not use our cornmeal. Many would not use rice."

Apropos of the development of new food habits he says: "Could Sir John Hawkins have dreamed, when he introduced a Peruvian tuber as a curiosity into Ireland, that his great-great-great grandchild (if he has one) would see one hundred and fifty-five million bushels of potatoes produced in that island alone?"

"When King John of France was being taken to England after the battle of Poitiers, and one of the principal items of his expenditure was for sugar, one of the kingly luxuries of the day, could he have possibly imagined that the time would come when the descendant of a West African slave would remark in the language of his captors: 'It just seems like some one was dead in the house to have no sugar'?"

Concerning prejudice he says: "When you brand a food as no fit to eat how do you arrive at that conclusion? If it is a food that you have never eaten before how do you know that you are right? If it is one with which you are already familiar, how do you know that the difficulty does not lie in its preparation?"

Prejudices seem to be less strong in America, probably because of our various and mixed ancestry and our broad, geographic and

climatic distribution, affording ample opportunity for the development of distinctive local tastes, and as there are many tourists and travelers constantly passing to and fro, there is a greater variety of food consumed in America probably, than in any other land today.

Stefansson, the Arctic explorer, has written interestingly upon the subject of food prejudices of men and dogs. He says: "Dogs brought up around ships and used to foraging in slop pails and eating highly seasoned foods, will eat any food that we have ever offered to them. It seems, therefore, that a dog used to many sorts does not mind eating one food more. Dogs brought up on a diet restricted to two or three articles will, if they are more than a year old, refuse at first when an entirely new food is offered to them."

Similarly we have found "well brought up" men, used in their homes to a large variety of foods, both domestic and imported, take very readily to any new thing (such for instance as seal meat). But when "poorly brought up" and used to only a half dozen or so articles of food in their regular diet, are generally very reluctant to try a new food unless it has been represented to them in advance as an expensive or very delicious thing. Of course, here the situation is not so simple as it is with dogs. For one thing, the man of the laboring type has a feeling of being degraded when he is compelled to eat the food of "savages," while the man of the intellectual type is appealed to by the mild flavor of adventure in experimenting with 'native' food."

Besides a wider range of food in the next century we can certainly look forward to an era free from food adulteration and food debasement. The improvement that has been made within the past two decades is a guaranty in this respect.

The persistence of the use of white flour for upward of a century is one of the finest examples of crowd psychology possible, for the bread baked with it has neither the nutritive qualities nor the palatability of a good, whole wheat oaf. It will take many years before white flour (much of which is chemically bleached to make it appear still whiter) is replaced by the whole wheat flour which our ancestors ate and for the lack of which many of us suffer various ills. A hopeful sign is the announcement of the largest baking company in the country that they have at last perfected a 100 per cent. whole wheat loaf, which they are offering to their patrons and that they will not tolerate the use of chemically bleached flour.

It is probable, too, that with the great increases in population which will have occurred by the next century, meat will be esteemed more for its flavoring possibilities than as a staple article of diet and that it will be more difficult than it is at present to get an excessive protein dietary, which is such a detriment to the ordinary sedentary individual. It is probable that eggs will continue to be used and that the same meats will be found in the future as are found now with the probable addition of whale meat, which is extensively eaten in Japan and has appeared in our markets in the canned form. A single whale will yield 80,000 pounds of meat which can be cut out in 100-pound chunks of lean boneless flesh, which, when cooked, is not unlike boiled beef. Reindeer meat may also be used. Both whale and reindeer meat are now being sold on the Pacific coast.

The inhabitant of America one hundred years hence will probably have access to a wider variety of purer, cleaner food than we of the present time enjoy.

THE MODERN TREND IN PROFESSIONAL EDUCATION.*

ADDRESS BY PROF. J. W. STURMER.

(Dean of Science, Philadelphia College of Pharmacy and Science.)

Like a river winding through the mountains, bending hither and yon, flowing north, and south, and east, and west, according to the topography of the region traversed, but trending inevitably toward the sea, the forward movements in education are in a path exceedingly devious, but like the river, they do describe a distinct general direction.

We must not, however, carry our analogy too far. The river ultimately reaches the sea, whereas educational progress cannot be expected to reach its goal, which is perfection; for teaching is an art—not a science—and in the arts perfection recedes before us as does the horizon before the traveler. Like other arts, teaching involves the human factor, a most disturbing factor. Every student is not only another student, but is a different other—which may be said with equal truth about every teacher. Indeed, no curriculum,

*Delivered at the Founders' Day Exercises, on February 23.

no system, no school or college, can be expected to obliterate the great variability in the members of the human race. The results of education have, therefore, always fallen short of our expectations, and there is no hope that we shall ever be wholly satisfied with the achievements of our educational institutions. If we consider that the opinions as to what education should accomplish are quite diverse, and that the advice proffered is equally perplexing in its variety, we need not be surprised to find educational vagaries, sundry and various, and obsessions, not a few. Nevertheless, we see, when we investigate carefully, that in education, also, there has been progress which is substantial and real. We find further that its results taken by and large, have not been as discouraging as certain critics would have us believe.

Let us consider briefly a branch of higher education, namely, the education which provides the training for a profession, that is for a calling involving the application of science, and this in certain direct service to mankind—the education of the medical practitioner, the pharmacist, the bacteriologist, the works chemist, the engineer—the education of the men and women who have contributed so conspicuously to the development of the natural resources of our country, have done so much to provide the creature comforts which we enjoy, and helped in the conserving of life, health and well-being, in the community in which we live. This branch of education affects us all, and in a very direct and intimate way. It is, therefore, a matter of public interest and importance.

To trace professional education in America, from its early years of struggle to present-day conditions, showing its inter-relation to human progress, and indicating its contribution to civilization, would be a most engaging task. It would, however, require extensive research, and more time for the presentation of the findings than could be provided in an evening's program. It would in fact prove a worthy subject for a volume, of which the summary could hardly be compacted into a short address. We must, therefore, be content with a few observations on some of the more recent and more significant developments.

We are celebrating tonight the one hundred and first anniversary of the founding of the Philadelphia College of Apothecaries—the first of its kind on the American continent—founded at a time when higher education in this country was in the pioneer stage, and

was classical and bookish rather than professional. But the birth of the College was coincident with the modern renaissance, which took the form of a marvelous development in science and its application to human needs; and we find that from that time forward, professional education has progressed by leaps and bounds, in extent and variety, and has outdistanced the older education, based so largely on mere book-learning. In 1821, bacteriology was unknown, medicine was empirical, chemistry was largely chaos, and two professors could cover the ground adequately for students in pharmacy; whereas at present the faculty of this College consists of 40 persons, and there are nearly 100 schools of pharmacy, about 125 schools of medicine, and about 600 institutions listed as offering courses in chemistry of one kind or another. And as to students, the enrollment in the colleges aforementioned, equals, approximately, the standing army of the United States. Whether we should contend that scientific progress fostered the development of professional education, or should take the view that the latter proved conducive to discoveries in science, is as unnecessary as the argument regarding the priority of the egg or the hen. For science education and scientific advance are reciprocally helpful, one to the other, and constitute a beneficent circle by which humanity has profited immeasurably.

If now we study more closely the development of professional education, we find first of all that in the early periods entrance requirements were either non-existent, or were quite indefinite, and were expressed in a rather sketchy way, in general and loose phraseology. Let us contrast that condition with the practice of today, and note how definitely and specifically, the admission requirements are set forth in the current catalogue of a professional school. Moreover, the proceedings of the various associations of colleges disclose the prominence which the subject of admission standards has held in the deliberations of these bodies, and we can here trace the gradual advances which were made, necessitated in part by the increasing complexities of science courses, but in the main due to the realization that colleges cannot bestow but can merely develop intelligence. If we consider at this point the deductions which psychologists have based upon the results of the army mentality tests, made in 1917, which show that only a relatively low percentage of human beings can reasonably be expected to succeed in a professional course, or

become competent practitioners of a profession, we reach a new viewpoint as to the importance of admission standards. We see also why certain colleges are proposing to supplement the four-year high school entrance requirements with special entrance examinations and intelligence tests; for the entrance standards serve not merely to make sure of a certain amount of learning on the part of the student, so that there may be an adequate foundation for his college studies, but they are expected to function also as a barrier, to exclude those applicants who lack in capacity and capability, and who would be unsuited for a profession. In short, entrance requirements in the last analysis, are designed primarily to protect the public against the dangers which would result if the ranks of the professions were swelled by the mediocre or the incompetent; and, secondly, to protect the latter against the hazard of wasting years of their precious youth in fruitless or nearly fruitless endeavor. A deeper realization of these facts, and a more acute feeling of responsibility in this matter, is a rather recent development of professional education, as is also the acceptance on the part of the faculties, of the task—a most difficult one—of excluding the unprincipled and the vulpine, whose predatory instincts might lead them to use their attainments and skill to the detriment of the community. Most colleges see their public duty in this respect clearly, and while they recognize that the problems involved are extremely difficult, they are determined, notwithstanding, to face them, and to do all that is humanly possible to guard the gateway which leads to the professions, so that the moral and ethical standards of these callings may be preserved.

So much for recent and pending changes in the methods by which the student personnel is selected. Let us now consider briefly certain tendencies in the teaching of the sciences. First of all, we note a greater emphasis upon the fundamentals of science, for to apply science, we must have science to apply—that much is certain. No amount of specialization along narrow lines makes up for a poor grounding in the basal principles. The acceptance of this truth —for such it is now recognized to be—explains in a large measure the lengthening of the courses in the applied sciences.

Let us see how science grows. In the development of science, man first observed facts. Having collected a fair number, he next proceeded to correlate these facts; and as a final step has come generalization. All science was evolved in this manner, although it

should be remembered that in more recent times the facts observed were in many instances not observed in nature, but are experimental facts, developed by laboratory processes, deliberately planned, and carefully executed. But the point is, that only through the instrumentality of generalizations can we deal with new facts, and find our way through the great maze of data which scientists, through the years, have accumulated. Take, for example, chemistry. Its progress for centuries was slow and laborious, and its devotees spent their energies in many fruitless researches. But note its development counting from the time, a little more than a century ago, when sound chemical generalizations were reached. It has been shown also that to teach a few chemical processes, without reference to the theories, leaves the student incapable of independent progress—a mere cook-book chemist, to follow by rote the procedure which others have worked out. Hence it is that in properly training the student in any branch of applied chemistry, we must teach the essentials of chemical theory, and this means a more extensive course. Suppose we now give our attention to pharmacy, which in a certain sense is the mother of chemistry, and to the course offered as a training for pharmacy, a calling which is based not on one science, but on several, namely on physics, chemistry and certain branches of biology. We still have the minimum course of but two college years, the course which meets the legal requirements as a preparation for pharmaceutical practice. But even here we observe the tendency toward fundamentals rather than toward the inclusion of a perplexing multiplicity of details; and to make room for a more thorough grounding in these fundamentals, and for a more logical sequence of subjects in the plan of study, this course will in the near future be lengthened by an additional college year. Like medicine, dentistry, or engineering, pharmacy is becoming more and more scientific, requiring that greater emphasis be placed upon the teaching of the essentials of science, and time and opportunity must be provided for this much-to-be-desired improvement.

Pharmacy, an ancient art, which for many years developed along empirical lines, has provided the initial training for many noted scientists—chemists, microscopists, botantists, mineralogists; and in colleges of pharmacy we may see a corresponding specialization along certain lines of applied science. This, to be sure, is a laudable adjustment to new conditions. But a more significant advance in

pharmaceutical education is indicated by the four-year course, planned in conformity to accepted academic standards, and providing not mere variety of specialized work, but a broad, liberal foundation for such work. This represents indeed a substantial advance, along logical, common-sense lines. and it will contribute greatly in maintaining the true professional standing of this calling. It is the step forward which again adjusts pharmacy to the present-day status of the sciences upon which it is based. Any profession which fails to emphasize its science basis, will, we know, become stagnant and non-progressive. If pharmacy were to perpetrate this blunder, it would speedily revert to empiricism, and its research would pass into the hands of physicists, and chemists, and biologists, of other fields of practice, with the result that pharmacy itself would become a thing lifeless and without a future.

As has been stated, pharmacy, an integral part of medicine, responsible for the manufacture and the standardization, and the preparing for the medical practitioners, the medicinal materials employed in the healing art, embraces applications of the several physical sciences. A thorough education in pharmacy must accordingly contemplate the teaching of the fundamentals of these sciences. But physics and chemistry cannot be studied without aid of mathematics. Therefore, a carefully planned course in this science has been added to the curriculum. Next we come face to face with the fact that in scientific investigations it is necessary to search the literature of foreign investigators. This leads to the inclusion of German and French. And finally, we come to the requirement which transcends all others, namely, that the student of science be well versed in the language in which his text books are written, his lectures are given, his recitations are conducted, and in which he must transmit his own thoughts, namely, English. If we lack words, or do not know how to assemble the right words to clearly express our ideas, our thought stream is a sluggish, colloidal stream, incapable of transfusion. English is the very backbone of every college course, whether in be in engineering, chemistry, or pharmacy. Noted engineers and famous chemists have seen fit to call attention, time and again, to the outstanding importance of a mastery of English as a factor in the advancement of every practitioner of a profession. The scientist or professional man who cannot express himself clearly, and with such force or grace as the occasion may require, is indeed under a handi-

cap, and no superiority along other lines compensates wholly for this deficiency.

So we come inevitably and quite logically to the conclusion that a thorough and liberal education in pharmacy should comprise four years of study, the first two years being devoted to the basal physical sciences and to mathematics and the languages, and the two higher years, to the professional branches. And when we compare the plan of study constructed on these lines with the curricula of our universities, we find that we have practically paralleled their courses in science and in engineering. We find also that in our Freshman and Sophomore years we have duplicated the two-year pre-medical course, required as a preparation for the study of medicine.

Conclusions reached independently by these three professions—engineering, medicine, and pharmacy—certainly deserve our serious consideration. So it has come about that the edifice of pharmaceutical education, after a number of minor additions, is now being raised off its rather flimsy foundations, and is being provided with a more substantial support, built solidly and in a workman-like manner, which assures the permanence of the structure.

As has been explained, the subjects of the two first years of the four-year course have been included for specific utilitarian reasons. But shall we say that they have no cultural value? What are the peculiar attributes of a study which qualify it for classification as a culture subject? What precisely is culture? We know that in certain academic circles, particularly in Europe, it is customary to speak of professional or technical studies as though they represented the antithesis of the cultural. If this is merely for convenience in grouping, we agree—mainly because we wish to be agreeable. We have no desire to open an academic debate with the classicists, who are largely responsible for this classification, and we would certainly not undervalue classical learning. We fail to see, however, why the writings of Democritus, in which we find set forth his rather hazy concept of the atom, should, if read in the original, be cultural, and the marvelous story of the developments of modern chemistry, which in its creative powers has "beggared the Lamp of Aladdin," be deemed devoid of cultural possibilities. It would seem that such a conclusion must be based upon a rather pedantic definition of the term culture. As we Americans interpret the word, it is not remoteness, nor antiquity, nor relative uselessness, nor is it anything

which leads merely to a meticulously correct use of language, which makes a study cultural, a term which to us implies all those things that tend to enrich and refine life, involving ideals which are of the heart, as well as ideas which are of the mind. "Not through language alone, nor through science alone, is human nature made whole," said Tyndal in his famous Belfast address. And not through language alone and certainly not through the classics alone, do we achieve culture. America has no leisure class—except the hoboes. All the rich, as well as the poor, are expected to perform some useful work. The mere scholar whose sole purpose it is to absorb vast stores of learning, is no more an object of admiration, than the freak who can consume six dozen oysters or ten pounds of beefsteak. Our applause is for the man who eats a normal ration, and fits himself physically to perform a useful piece of work. In like manner, it is not the scholar with an astonishingly high "absorptive index" for learning, but rather he who has a good "working knowledge," knows how to use reference books, and who *does something in his professional capacity,* is esteemed and admired. And this American attitude toward the productive worker, influences our conception of culture, at least to a certain extent. So we have come to think of culture as something which not only conduces to the happiness of the person who possesses it, but which also makes him pleasanter to deal with, to work with, to be with.

And with this broad American interpretation of the term in mind, we do not hesitate to contend that professional schools, as well as classical schools, are, and must be, centres of culture. In other words, it is not the sole function of such schools to teach their students how to achieve certain results with test tubes, or the microscope, or the scalpel, or the mortar and pestle. Indeed, no. It is expected rather that our graduates be men and women of refinement, men and women with ideals, with a philosophy of life which is sane and tolerant and tinctured with the touch of human altruism—men and women who have learned to make a living in some professional activity,—yes,—but who have also learned how to live a good life, full, satisfying, and of benefit to the community in which they chance to practice their calling. And this, I am sure we shall all agree, is a distinction with a difference, indeed, a great difference.

Finally the country expects that its professional schools be training camps for loyal, patriotic, American citizens. A few short

years ago, when the bugle call sounded, and our young men flocked to the colors, the nation as a whole caught the "rhythm of marching men." How splendidly did the colleges, at that critical time, give evidence of their loyalty! And how speedily they were converted into training camps for soldiers and sailors! Yet when there came peace, these colleges returned gladly to the task of training men and women for the pursuits of peace. But they are Uncle Sam's training camps just the same; their spirit is just as patriotic, and in these troublesome times their services just as necessary. When our country called, many a student left his books with the remark that he was embarking for "the great adventure." But is not the developing of our national resources, the improvement of the health of our citizens, the advancement of science, also a great adventure? And does not our country continue to call for recruits, now to serve in its army of peace? And if so, are not our professional schools just as necessary to the nation, though in a different way, as are West Point and Annapolis? Fortunate it is that at no time in the country's history have the colleges realized more keenly their solemn duty to the State. Addresses on citizenship, on patriotism, on the duty of service for the public welfare, on professional ethics and on kindred topics, now constitute an essential feature of the college curriculum, in order that our soldiers of peace also may possess that splendid loyalty and morale which characterized our boys in the camp and field.

—Yes—no doubt—our pedagogical Jeremiahs may find in modern education much ground for criticism and for pessimism. But the graduate who at college experienced his mind's awakening, was touched with the divine spark of inspiration, found a guide in the pursuit of happiness, learned to see more clearly his duty to his fellowman, and his obligations to the State, will, through the years, even after he has passed life's meridian, and hit the sunset trail, hold his college in loving memory, as he does the home of his childhood. With him the words Alma Mater will have a deep significance, and when he speaks them, it will be no mere lip service. The sight of her emblem will affect him as the view of the Star Spangled Banner in the home harbor thrills the returning traveler. How specious, and hypercritical, and altogether inconsequential, appear to him the attacks on the colleges—which fortunately are in no danger of that complacent self-sufficiency which prevents progress, and therefore can profit but

little by such criticism.—True, professional education does not always make headway in a straight line, to a goal in plain view. Like the river winding through the mountains, its movements are tortuous, bending hither and yon; but in the things which count most, its general trend is unmistakably governed by the conviction that the future of our civilization will to a large degree be in the hands of those who are passing through the portals of our colleges.

Any college which has this conviction, accepts the responsibilities implied, and frames its policies accordingly, need have no misgivings about its future.

THE STABILITY OF ARSPHENAMINE SOLUTION.

By Peter Masucci,

From Mulford Biological Laboratories, Glenolden, Pa.

Arsphenamine appears on the market in the form of an amorphous yellow powder. Chemically, it is the dihydrochloride of 3, 3, diamino, 4-4- dihydrozy-arseno-benzene. An aqueous solution ot Arsphenamine is acid, having a hydrogen ion concentration of about pH 4.8. The solution must, therefore, be neutralized before it can be injected intravenously. The addition of two molecules of sodium hydroxide precipitates the free base; three molecules form the soluble monosodium salt; and four molecules form the disodium salt, the form best suited for intravenous injection. The reaction of the disodium salt is decidedly alkaline or a pH of 9.4.

The prevalent view is that the dihydrochloride of Arsphenamine is very unstable in air, but the work of Voegtlin and Smith (1) showed that it is exceedingly stable to atmospheric oxygen. In alkaline solution, however, oxidation takes place very rapidly. Roth (2) showed that shaking alkalinized Arsphenamine for ten minutes in the presence of air increased the toxicity at least 60 per cent. Myers (3) seems to think that shaking has been over-emphasized, for it has been proved that shaking acid solutions causes no harm, and at low temperatures little harm is caused with alkaline solutions. Lake[4] showed definitely that there is a decrease in toxicity when Arsphenamine is allowed to stand thirty minutes or more after the addition of alkali.

In order to obtain more data on the keeping qualities of Arsphenamine solutions, a series of experiments was planned to determine (1) the increase in oxidation of the disodium salt solution to its corresponding oxide and (2) the increase in toxicity. These two factors were determined on solutions kept at room and ice-box temperatures in ampules from which the air had been displaced by nitrogen gas.

At the suggestion of William M. Clark, of the U. S. Hygienic Laboratory, the following procedure was used to fill the ampules under nitrogen gas: 15 grms. Arsphenamine were dissolved in 2865 cc. distilled water. The air in the bottle containing the solution was replaced by nitrogen gas. The theoretical amount of alkali, 135 cc. normal NaOH was added to the solution and nitrogen was again bubbled through to dissolve the precipitate formed upon the gradual addition of the alkali. The clear solution, containing 5 mgms. of Arsphenamine per cc. was now candle-filtered using nitrogen as a source of pressure. The air in the filling apparatus was displaced by nitrogen and the solution was filled into 80 cc. ampules from which the air had been previously displaced by nitrogen. At no time was air allowed to come in contact with the solution.

Part of the filled ampules were held at room and part at ice-box temperature. Control ampules of Arsphenamine solution of similar concentration in contact with air were also kept. From time to time samples were taken and observed for change in color and appearance of precipitate. Determinations were made to show increase in oxidation and toxicity.

Arsphenamine is oxidized by iodine quantitatively; each molecule of Arsphenamine requires four atoms of oxygen. The degree of oxidation resulting in the solutions on standing can be followed very closely by this method. At certain intervals samples were taken and titrated with standard iodine in an acid solution.

The toxicity of the solutions was determined from time to time by injecting into white rats according to the method prescribed by the U. S. Hygienic Laboratory.

Table I shows the degree of oxidation which took place in the solutions, change in color and formation of precipitate. Table II shows the results of the toxicity tests.

TABLE I.

Date	Solution	Color	% Oxidized	Precipitate
8/10/21*	under air, room t°	yellow	0	none
	" " icebox t°	"	0	"
	" nitrogen, room t°	"	0	"
	" " icebox t°	"	0	"
8/17/21	under air, room t°	green	25	very heavy
	" " icebox t°	red	10	none
	" nitrogen, room t°	yellow	0	"
	" " icebox t°	"	0	"
8/26/21	under air, room t°	green	35	very heavy
	" " icebox t°	"	20	" "
	" nitrogen, room t°	reddish tinge	2	none
	" " icebox t°	yellow	0	"
10/20/21	under nitrogen, room t°	very red	10	"
	" " icebox t°	yellow	0	"
11/15/21	under nitrogen, room t°	very red	8	"
	" " icebox t°	yellow	0	"
12/28/21	under nitrogen, room t°	very red	9	"
	" " icebox t°	slightly reddish tinge	2	"

*Date solutions were prepared.

TABLE II.

	Solution kept on ice					Solution kept at room temp.				
	No. injected	Healthy	Dead in 2 days	Dead in 2 weeks	Live 2d week	Injected	Healthy	Dead in 2 days	Dead in 2 weeks	Live 2d wk.
Fresh	5	4	0	0	4	5	4	0	0	4
1 wk.	6	3	3	0	0	6	5	1	1	3
2 wk.	5	5	0	2	5	5	5	0	1	4
3	6	5	0	2	3	6	3	1	0	2
4	6	5	0	0	5	6	6	1	0	5
5	6	6	0	0	6	6	4	0	0	4
6	6	6	0	0	6	6	5	1	0	4
7	6	6	0	0	4	6	5	3	0	2
8	6	4	0	0	4	6	5	5	0	1
12	6	5	0	1	4	6	6	4	0	2
16	6	5	0	0	5	6	6	6	0	0

The above results may be summarized as follows: Arsphenamine solutions can be kept under nitrogen gas at ice-box temperature for four months without a noticeable change of color, increase in oxidation or toxicity. Solutions kept under nitrogen but at room temperature begin to show a change in color from yellow to a reddish tinge in about two weeks; at the end of eight weeks about 10 per cent. becomes oxidized with a very noticeable increase in toxicity. The experimental data indicates very clearly that the temperature at which solutions are kept is a very important factor. The oxidation of Arsphenamine to the so-called "arsenoxide" takes place

much more rapidly at room temperature than at ice-box temperature. This fact might be used in the preparation of Arsphenamine solutions for intravenous injections where a certain amount of shaking is necessary in order to get the drug in solution. Shaking at low temperature should not cause any material increase in toxicity.

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NOTE ON THE OIL OF AGASTACHE PALLIDIFLORA.

By James F. Couch,

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The giant hyssop, Agastache pallidiflora (Heller), Rydb.[1], is one of the labiates. It is widely distributed throughout the mountainous regions of the far west and Pacific coast and, in some districts it is very abundant. The material which was used in the following experiments was obtained at the Experiment Station of the Bureau of Animal Industry, at Salina, Utah, situated at an altitude of about 8,000 feet, and in the Wasatch range.

The writer's attention was first directed to this plant by the very intense, fragrant odor which diffuses through the air in its neighborhood. Before the blossoms of the plant have opened the odor noted resembles that of thyme; after blossoming the odor is more like a mixture of thyme and peppermint. The leaves of the plant bruised between the fingers develop a strong thyme odor; the flowering heads, subjected to the same treatment, yield an intense peppermint odor with a small thyme component. It was,

[1] Botanical designation furnished by the Bureau of Plant Industry, U. S. Department of Agriculture.

therefore, thought of interest to investigate the essential oil of this plant as a possible source of thymol or menthol.

Accordingly several collections of flowering heads and of leaves were made and the fresh material was immediately, except for one experiment, subjected to steam distillation. The quantities used and the yields of dry oil were as follows:

July 28,	3720. Gm. Flowers,	yielded	6.84 Gm. oil	0.184%
Aug. 5,	2560. Gm. Flowers,	"	3.96 Gm. "	0.155%
Aug. 11,	3500. Gm. Flowers,	"	11.06 Gm. "	0.316%
Aug. 17,	950. Gm. Leaves,	"	0.79 Gm. "	0.083%

The first flowers collected were just beginning to open and full maturity was not attained until about two weeks after when the third lot was collected. This probably accounts for the larger yield of oil from the lot of August 11. The lot of August 5 was ground through a meat chopper and allowed to stand over night before distilling. Contact with the air turned the ground material deep brown possibly through oxidation of some phenolic constituent. The leaves used were carefully separated from the stems of the plant. These stems are coarse and fibrous and do not appear to contain oil. The leaves were then ground through the meat chopper and steam distilled.

The oils obtained from the flowers all carried a very penetrating peppermint odor with some marked suggestion of thyme. They were slightly yellow. The oil from the leaves had a rank thyme odor only. None of the samples of oil, nor any of the aqueous distillates containing dissolved oil affected ferric chloride solution and all were neutral to litmus.

The following physical constants were determined for the oil from the flowers:

Density at 20°	0.91924.
Specific rotatory power, at 25°....	—8.60°
Index of refraction at 25°	1.4865.

The oil is soluble in the ordinary solvents. On cooling to —10° and letting stand at that temperature for several hours there was no separation of any crystalline material. Consequently, the amount of free menthol, if any, present cannot be very large. Phenols were tested for by the usual absorption method using 5% NaOH. The

volume of the oil diminished slightly, but on acidifying and shaking out the aqueous layer with ether, no phenols were found. Pulegone and other ketones were tested for and found absent.

The small quantity of material did not permit a more extensive investigation of these oils. In addition the writer cannot now devote to this subject the time necessary to complete the chemical examination. Therefore, this note is published in order to record the known facts and to direct attention to this interesting volatile oil.

THE EVOLUTION OF CHEMICAL TERMINOLOGY.
II. PHOTOTROPISM. ORGANOTROPISM.

By James F. Couch.

In an earlier paper[1] I discussed some of the causes of ambiguity and confusion in the application of chemical terms. Another source of confusion arises in the specific use of similar or identical terms to describe dissimilar phenomena in different sciences. The terms may have been coined independently from the Latin or Greek roots by scientists working in widely different fields and yet, with the broader extension of chemical control in natural processes, the separate phenomena may be recognized as essentially chemical and the term becomes a chemical word with two or more distinct meanings.

An excellent example of this condition occurs in the terminology manufactured out of the Greek word *τροπή*, "a turn." The idea of turning is variously used in science to express change, reversal, arrangement, readjustment, circular or spiral propagation and intramolecular rearrangement. All of these processes have contributed to the collection of terms under consideration. The Greek work is anglicized "tropism" and this term has been used in a very specific sense by biologists and physiologists.

A tropism is a forced movement towards or away from some source of stimulus or is an adjustment of a body so as to minimize or equalize the effect of some external force. As generally applied it has always referred to living things and the usual definitions of the term restrict it to organisms, *viz.*, "The turning or move-

[1] This Journal, 94, 91-6 (1922).

ment of protoplasm or organized matter in relation to external matter or influences," "The inherent tendency of a living thing to respond definitely to an external stimulus," and "The innate tendency of the organism to react in a definite manner to external stimuli. . . ."

A more detailed and definite statement and one which gives us some insight into the mechanism of tropistic behavior is the following from Jacques Loeb.[2]

"Normally the processes inducing locomotion are equal in both halves of the central nervous system, and the tension of the symmetrical muscles being equal, the animal moves in as straight a line as the imperfections of its locomotor apparatus permit. If, however, the velocity of chemical reactions in one side of the body, *e. g.*, in one eye of an insect, is increased, the physiological symmetry of both sides of the brain and as a consequence the equality of tension of the symmetrical muscles no longer exist. The muscles connected with the more strongly illuminated eye are thrown into a stronger tension (we are speaking of positively heliotropic animals exposed to only one source of light), and if new impulses for locomotion originate in the central nervous system they will no longer produce an equal response in the symmetrical muscles, but a stronger one in the muscles turning the head and body of the animal to the source of light. The animal will thus be compelled to change the direction of its motion and to turn to the source of light. As soon as the plane of symmetry goes through the source of light, both eyes receive again equal illumination, the tension (or tonus) of symmetrical muscles becomes equal again, and the impulses for locomotion will now produce equal activity in the symmetrical muscles. As a consequence, the animal will move in a straight line to the source of light until some other asymetrical disturbance once more changes the direction of motion."

The foregoing describes a tropism the stimulus for which is a source of light. The phenomenon is termed heliotropism or heliotaxis, and phototropism or phototaxis, the last named being the more preferable for several reasons which I shall develop below. Common instances of this phenomenon are seen in the attraction of moths to flames, of sea birds to the giant reflectors in light-houses, and in the bending of house plants toward the window.

[2] Forced Movements, Tropisms, and Animal Conduct. Vol. 1 of Monographs on Experimental Biology. Philadelphia. J. B. Lippincott Co., 1918, p. 13.

There are, however, many other stimuli which may result in tropistic behavior and the specific response to each has been in every case distinguished by a particular name. We recognize geotropism (geotaxis) in which the force of gravity (as exerted by the earth) is regarded as the stimulus. Tropistic reaction to any stimulus produced by chemical inequalities in the environment of an organism is termed chemotropism (chemotaxis) a special case of which is hydrotropism in which the stimulating substance is water. Reaction to difference in temperature is thermotropism (thermotaxis); response to contact or other mechanical stimulus is thigmotropism or stereotropism; and reaction to electric stimuli is electropism. Rheotropism or rheotaxis is "the phenomenon of a body moving in a direction contrary to the current of the fluid in which it lies," a special case of which is anemotropism in which the organism adjusts itself to the direction of the wind. Loeb considers rheotropism and anemotropism as due to a tendency toward fixation of a moving retina image.

In all of the foregoing reactions to external stimuli the tropism is manifested by a change in the direction of motion, or of propagation, or an adjustment of spatial relationships. These may be considered characteristic of tropistic behavior.

In the domain of pure chemistry the word tropism or a derivative of it has been used in the formation of a number of terms none of which describe phenomena that relate to true tropistic behavior. There are desmotropism and merotropism for dynamic isomerism; phasotropism for a virtual tautomerism; and allelotropism for a condition of tautomeric equilibrium. There is again the well-known allotropism of the elements so strikingly shown by carbon. From the physicists we get the terms isotropism and anisotropism referring to the physical equality of the properties of a body when viewed from different angles.

The zoologists employ the terms dextrotropic and dexiotropic to indicate that the direction of propagation of the spiral in certain shells is toward the right or clockwise.

Other tropistic terms which may be mentioned are, parasitotropic, "having special affinity for parasites," of which the noun is parasitotrope; eosinotactic, "exhibiting an attractive or repulsive influence upon eosinophile cells," and the chemotherapeutic terms, organotropism, which may be defined as the chemic affinity of sub-

stances for the organs or tissues of the body, and neurotropism, a special case of organotropism, "the attractive influence which nervous tissue exerts upon nutritive and other substances." It is part of the purpose of this paper to consider the term organotropism and its satellite, neurotropism.

Our interest in the other term which forms part of the present title arises from its use by the physical chemist. While phototropism is used by the biochemist to denote the tropistic response to light stimulus; in the vocabulary of the physical or photochemist it indicates a reversible isomeric change due to the influence of light energy and accompanied by a color change. The same term is used to label two essentially different chemical phenomena which come to us from the most diverse scientific sources, biology and optics.

Fortunately a satisfactory remedy is available. One may substitute for "tropism" in biological terms the suffixes "taxis" or "taxy," derived from the Greek τάξις, arrangement, adjustment, or order. Phototropism then becomes phototaxis and indicates, instead of a turning to or from light, an adjustment with reference to light. This change is preferable because we know that any change in the direction of motion of a tropistic animal or plant is merely incidental and not essential. The newer form has been used by the more careful writers and we are now well accustomed to the terms chemotaxis, heliotaxis, geotaxis, etc. The generic name for the phenomena will remain as it occurs today, tropism, for it is well established and there is no convenient substitute for it.

The suggested change has also the advantage of leaving the field free to the chemist not only in the use of the term phototropism, but also in the use of allelotropism, desmotropism, phasotropism, allotropism, and so on.

When we consider the term organotropism, however, the situation is different. There is, in physiology, a number of terms derived from the Greek word for nutrition, τροφή trophism, the phenomenon of nutrition; trophic, pertaining to nutrition, and so on. It is obvious that there is great liability to confusion between tropism and trophism. Conflicting with organotropism there is organotrophism, a term relating to the nutrition of the tissues; conflicting with neurotropism there is neurotrophism, a term which designates the nutrition of the nervous tissue. The crowning achievement of term combination may now be mentioned; it consists of the

two very enlightening terms, "trophotaxis" and "trophotropism." The first of these indicates "the movement of cells in relation to a supply of food" and the second denotes "the chemotaxis of the nutritive matter of cells."

It is clear, I think, that the position of the term organotropism is untenable. The physiologist's organotrophism is the older term and, from classical as well as scientific considerations, it does not violate good taste. We cannot convert the former into "organotaxis" and thus save it for it defines a phenomenon which is not a tropism. The acceptable form of the term would be "organophilism" with the adjectives "organophil" and "organophillic," for the essential force which operates to produce the phenomenon is chemical attraction. Similarly neurotropism may become neurophilism. These phenomena will then take their proper place beside eosinophilism.

There is an attraction between certain tissues and some substances through which those substances tend to accumulate in certain organs or cells, but we cannot argue that the attracted molecule responds tropistically to a stimulus. If we affirm that we shall also be obliged to attribute tropistic behavior to particles of iron which move under the influence of the magnet. Although there is little question that tropistic behavior is fundamentally purely mechanistic and depends upon the law of mass action, the term tropism is confined to the reaction to stimulus of organized matter which is capable of free and self-initiated motion in the absence of limiting stimuli, and which responds to stimuli only because of its capabilities for free and self-initiated motion.

SUMMARY.

I. The terms phototropism, geotropism, chemotropism, etc., as used by biologists and biochemists to describe true tropistic behavior should be discarded in favor of the preferable terms, phototaxis, geotaxis, chemotaxis, etc.

II. The term phototropism as used by the photochemist to describe the reversible isomeric changes produced by light energy may be retained as such.

III. The chemotherapeutic terms organotropism and neurotropism should either be discarded or should be changed to organophilism and neurophilism.

IV. The word tropism is retained as the generic term for phenomena of true tropistic behavior.

ABSTRACTED AND REPRINTED ARTICLES

REMOVAL OF STAINS FROM TEXTILES.*

In the *Scientific American Monthly* for July, 1921, Harvey V. Elledge and Alice L. Wakefield discuss the removal of stains from wash goods. This article was originally written for laundry owners and is accompanied by a "procedure chart," which tells at a glance what reagent to use for removing the various stains in the washing of cotton, linen, wool and silk.

The writers recommend the following reagents for the removal of stains:

Acids.	Alkalies.	Oxidizing reagents.	Reducing reagents.	Solvents.
Oxalic. Hydrochloric. Acetic.	Caustic soda. Soda ash. Ammonia. Potassium-cyanide.	Javelle water. Hydrogen dioxide. Potassium permanganate. Sodium perborate.	Sodium bisulfite. Sodium bisulfite used with zinc. Sodium thiosulfate.	Ethyl alcohol. Amyl alcohol. Ethyl ether. Acetone. Aniline. Chloroform. Carbon tetrachloride. Carbon disulfide. Benzine. Kerosene. Gasoline. Oleic acid.

The acids and alkalies and the oxidizing and reducing reagents are used as a rule, well diluted.

The various stains encountered in laundry work are removed as follows:

"*Albumin.*—The regular standard washing process includes a lukewarm first bath for the purpose of dissolving any albuminous materials that may be present.

"*Blood.*—The albuminous portion of this stain is removed in the first bath of lukewarm water; the stain proper, which is due to

*Reprinted from the *Naval Medical Bulletin.*

the hemoglobin or coloring matter of the blood, is removed in the bleach bath. If the fabric is of the kind that can not be treated with Javelle water, the stain may be treated with hydrogen dioxide.

"*Bluing.*—Bluing is of three kinds—ultramarine blue, that gives the desired color by depositing small insoluble particles of blue on the fabric; Prussian blue, that dyes the fabric with a soluble dye; and aniline blue, that dyes the fabric with an insoluble dye. Ultramarine blue, which only gives trouble by being used too heavily, may be removed by simple washing; Prussian blue, which in an alkaline bath is changed to iron oxide and gives a rust stain, has to be treated with oxalic acid solution. The aniline blues, if used too freely, dye the fabric permanently as far as the ordinary solvent water is concerned and must be removed by treatment with oxidizing or reducing agents, according to the nature of the dye used. Javelle water, or potassium permanganate solution, is used to oxidize these blues on cotton or linen fabrics while potassium permanganate solution or hydrogen dioxide is used on silk and wool. Sodium bisulfite solution and zinc may be used on both the animal and vegetable fibers as a reducing agent. The potassium permanganate solution treatment is not complete in itself, as it leaves a brown stain of manganese dioxide in the cloth, which must be removed by treatment with oxalic-acid solution. If it is found necessary to repeat the treatment, the excess oxalic acid should be washed from the fabric before more permanganate solution is applied. It is always well to observe the precaution of rinsing from the fabric any excess of solution when two solutions are alternated, because the excess of solution present reacts to neutralize the effect of the other solution in a manner that has no effect in the removal of the stain. There is no need for such useless reactions.

"*Cocoa and chocolate.*—These stains occur in most cases on white table linens and when too deep to be removed by the water and soap are removed by the bleach bath in the ordinary laundry way.

"*Coffee.*—Javelle water, applied in the bleach bath, removes this stain effectively.

"*Cream and ice cream.*—The principal ingredient that causes trouble in this type of stains is the butter fat present. When this

is removed with hot water and soap, the stain is usually gone completely. In the case of an ice cream that has fresh fruit juice or a food die present as coloring matter the stain will be removed by Javelle water.

"*Dyes.*—The treatment for a dye stain has always to be determined by a few tests on some portion of the stained fabric. The first trial may be made with Javelle water; then with permanganate solution, then with sodium bisulfite solution and zinc. The kind of material involved and the dye itself have to be taken into consideration for the successful treatment of this type of a stain. The removal of hat dyes is facilitated by treatment with 95 per cent. ethyl alcohol, in which the greater portion of the dye is soluble. A residual stain may have to be treated with one of the oxidizing or reducing agents.

"*Egg.*—This stain is partly albuminous, partly fatty, and in most cases will be removed by a formula that includes a lukewarm first bath and hot suds.

"*Fruit.*—Fruit stains can readily be removed by treatment with Javelle water.

"*Grass.*—This stain is also removed from cotton and linen by treatment with Javelle water. Silks and wools are treated with a mixture of equal parts of ethyl alcohol and ethyl ether. This is a solvent for the green dye present in grass.

"*Grease.*—The average grease stain is removed in the standard washing process. Any stain that survives this treatment may be softened with oleic acid and lard and washed in a hot solution of soda ash. If the grease has contained a mineral staining agent like iron or some type of dyestuff, it can be treated specially, as described under these headings. The best treatment to be accorded to silks and wools is with one of the many grease solvents. . . . The solubilities of the different types of grease vary with the different solvents, and it is often necessary to experiment with several solvents before the most efficacious one is found.

"*Gum or resin.*—The type of the gum or resin decides the solvent that should be used. Common chewing gum is soluble in

carbon tetrachoride; varnish is soluble in alcohol; resins are soluble in ether, alcohol, and turpentine, the source of the resin determining which solvent is best. Since there is no way to decide which resin is present, the method of trial and error must be applied to discover which solvent is to be used.

"*Ink.*—Iron inks are best removed by treatment with warm oxalic acid. If such treatment does not remove the stain completely, it is possible that the ink has been a mixture of iron ink and an aniline dye, in which case a second treatment with Javelle water is necessary. India ink and printers' ink are both suspensions of carbon in a gum-like medium, and should be removed ni the regular laundering process. If such treatment is not effective, the stain may be loosened with lard and laundered again. Silver-nitrate inks have to be treated with sodium thiosulfate or with Javelle water. Javelle water converts the silver to an insouble, colorless salt that has to be removed by treatment with dilute ammonia water. If this precaution is not taken, the silver may again oxidize to the colored salt and the stain reappear. Indelible pencils contain both graphite and an aniline dye; the dye can be removed by treatment with Javelle water, while the graphite will be washed away mechanically.

"*Iron.*—The specific treatment for iron stains is warm oxalic-acid solution.

"*Leather.*—Javelle water has been found to remove these stains from the cotton and linen fabrics, but in the case of silks and wools the stain is permanent.

"*Medicines.*—The medicines containing organic materials are usually removed in the regular laundry process; any stain surviving this treatment can be treated with Javelle water. The medicines containing salts of the heavy metals, like iron, silver, etc., may be treated with potassium cyanide. The cyanides of these metals are water soluble and are removed by means of this solvent after conversion has taken place.

"*Mildew.*—These stains are usually removed in the standard washing process, but heavy stains may have to be treated alternately with Javelle water and oxalic acid.

"*Mud.*—The mud itself is removed in the regular water washing, but a residual stain of iron is often encountered. This is treated, as all iron stains are, with warm oxalic acid.

"*Paint and varnish.*—These stains are best removed before laundering. They may be loosened by treatment with oleic acid and then laundered, or they may be treated with one of the solvents that are given in the table of reagents. The character of paint determines the treatment applied. Paints are composed of some vehicle and a pigment; the vehicle hardens or sets by the evaporation of some volatile ingredient or by the absorption of oxygen from the air, depending upon its chemical nature. The pigment can be removed mechanically after the vehicle carrying it is dissolved again.

"*Perspiration.*—This stain, being water borne, is usually removed by simple soap and water washing. If it is connected with the running of a dye, treatment for the dye must be applied. Colored goods that have been discolored by perspiration may sometimes be restored by sponging with weak acid or alkaline solutions.

"*Scorch.*—Scorched cotton or linen may be restored by treatment with Javelle water alternated with oxalic-acid solution, provided the scorch has not completely destroyed some of the fabric. The same results may also be obtained with potassium permanganate and sodium bisulphite solutions. Light scorches on silk and wool may be partially restored by treatment with permanganate solution, but nothing can be done for heavy scorches on these fabrics.

"*Sirup.*—Sirup stains are usually removed in the standard washing process, because the medium of the stain, the sugar, is removed. If a fruit juice has been present, some stain may survive this process, but the treatment described under Fruit will remove it satisfactorily.

"*Tar and tarry.*—See treatment of paint.

"*Tea.*—Tea stains are usually removed in the washing process, but the occasional heavy one should be treated with Javelle water when it appears on cotton and linen and with potassium permanganate or hydrogen dioxide when it appears on silk or wool. This

stain is in most cases the result of the tannin present in the tea, but in some cases is due to a dye that is added to give a darker color to the infusion.

"*Tobacco.*—The stains from tobacco are usually soluble in the standard washing process, but occasionally stains that require longer treatment are encountered. They may be treated with the oxidizing agents that are permissible with the type of fabric involved or they may, in case of the tarry residue from pipes, be treated with ethyl alcohol.

"*Tumeric.*—This is one of the seven dyes permitted by the United States pure-food law to be used in foodstuffs. Tumeric stains are usually to be removed by treatment with Javelle water or permanganate solution, but in cases that do not respond to this treatment amyl alcohol will be found effective.

"*Verdigris or copper stains.*—This stain, if not removed by the usual laundry process, has to be treated quite drastically with dilute hydrochloric acid. If only a weak solution of acid is used and care is taken to remove all traces of it afterwards, no ill results will be noticed.

"*Walnut.*—This stain is one of the worst encountered on fabrics. It can usually be reduced to a light gray color on cotton and linen by treatment with Javelle water, but when on silk and wool no treatment can be recommended.

"*Wax.*—The most satisfactory method of removing waxes from fabrics is to place the spot on a piece of blotting paper and apply a warm iron. The heat liquefies the wax and the blotting paper absorbs it. If traces remain after this treatment, they may be sponged away with one of the organic solvents."

In conclusion it is appropriate to suggest that inspection of garments for stains be rigidly maintained in the receivng room. Many times stains are set in laundering, and offer a greater problem for removal than they otherwise would.

OREGON BALSAM.*

By E. M. Holmes, F. L. S.

The oleoresin known in commerce under this name has for many years past taken the place of Canada balsam to a more or less extent. So far as can be gathered from various records, the earliest mention of its being substituted for Canada balsam was in 1872-1873, when there was a scarcity of the latter (*Proc. Amer. Ph. Assoc.*, 1873, p. 1192; 1874, p. 423). This statement is quoted in "Pharmacographia," second edition, page 615, but no indication of its botanical source is given, nor any means of distinguishing the two balsams.

In August, 1913, we learn from the *Journal of the American Pharmaceutical Association*, page 982, that "considerable difficulty has been experienced in the past year or two in obtaining Canada balsam of fir." It is stated that "it was then practically unobtainable, and that there would be none available till the next crop be gathered. In view of this fact it has become necessary to find a suitable substitute. Accordingly, there is considerable Oregon balsam of fir being offered to the trade. This is an allied natural product, and bears a close resemblance to the better-known Canada balsam of fir." At that date, information concerning Oregon balsam of fir was so meagre that Messrs. J. G. Roberts and M. M. Becker sought to obtain data for the identity and purity of this product, so as to distinguish it from Canada balsam, and obtained through Mr. R. G. Bailey a genuine sample of the Oregon balsam of fir for chemical examination. They found that it differed in its viscosity, being thinner than Canada balsam; in its solubility in alcohol, being completely soluble in it; whilst, according to the U. S. P., Canada balsam yields a turbid solution. Oregon balsam does not solidify even when mixed with 60 per cent. of its weight of moistened magnesium oxide, whilst Canada balsam should solidify when mixed with 20 per cent. of moistened magnesium oxide. Oregon balsam is also slower in drying; a drop spread on a glass plate was still sticky at the end of three weeks, while that of Canada balsam was noticeably drier, and did not adhere to the finger when touched.

*Reprinted from the *Pharm. Journ. and Pharmacist*, February, 1922.

The authors conclude that the acid number of Oregon balsam is the best means to establish the difference between it and Canada balsam, the acid number of which is 87. That of the genuine sample of Oregon balsam gave 111, and that of other commercial samples varied from 100.5, 100.8, 105.82, 106.75, but in every case was considerably higher than 87.

The botanical source of Oregon balsam is given in an article in the *American Journal of Pharmacy* (1919, p. 345) as *Pseudotsuga taxifolia,* by Mr. S. A. Mahoud, chemist in forest products, of the U. S. Food Products Laboratory, Madison, Wisconsin. He remarks that "it is probably employed to some extent in the place of Canada balsam." In February, 1919, the market price was given as $1.75 to $1.80 per gallon, the price having increased from $1.15 to $1.25, the increase in price being the result of increased domestic demands owing to the greater use of the Oregon balsam, particularly by the varnish trade, also as a substitute for Venice turpentine, particularly in the ceramics industry and in the manufacture of porous plasters.

An interesting account of the method of obtaining the Oregon balsam is given by Mr. Mahoud. The oleoresin collects in cavities in the tree in pockets, produced especially in wind-shaken trees (probably by the wind bending the trunk). These pockets in time fill with oleoresin, and if an aperture is made it readily flows out. Trees containing such pockets are spotted by collectors, who bore holes into them (being probably guided by the one-sided trend of the branches so readily observed in trees in wind-swept places in this country). From the holes bored into the trunk one to three gallons is frequently obtained from a single boring. It is suggested by Mr. Mahoud that the method adopted in Europe of making artificial pockets in the larch in the spring in mature trees about forty inches in girth would probably yield a more certain harvest if applied to the Oregon fir, *Pseudotsuga taxifolia.* These cavities extend to the centre of the larch at about a foot from the ground, and, when made, the holes, about 1½ inches in diameter, are plugged with a dry larch plug to prevent loss, the cavities being emptied in the autumn by an auger. In the case of the larch, the tree is but little injured, and is said to yield oleoresin for twenty-one to fifty years (Tschirsch, "Die Harze und die Harzbehalter," 1906, p. 614, and G. Planchon and E. Collin, "Les Drogues Simples," 1, p. 70). As

the cost of the Oregon fir balsam is about one-sixth the cost of that of Canada balsam, it will probably replace the latter for many purposes, except that of microscopical work.

From an article by Prof. Augustin Henry on the Douglas fir, it will be noticed that he uses the synonym *Pseudotsuga Douglasii* for the tree which Mr. Mahoud calls *P. taxifolia*. This tree, which has recently been recommended by Prof. Henry for cultivation in suitable localities in Britain and British Dominions, since it is a rapid grower, forms excellent timber and yields a quantity of oleoresin, and it is evidently worthy of the serious attention of forest officers. In British Columbia one firm has already established a plant to treat ten barrels per day of the oleoresin.

Canada balsam is collected in such a different manner and in so much smaller quantity, and the collection is so little explained in most text-books of materia medica, that it may be interesting to recall some of the details published more than forty years ago in the Report of the Committee on the Drug Market to the American Pharmaceutical Association at its meeting at Toronto (*P. J.*, April 13, 1878, p. 813).

Canada balsam is largely collected in the province of Quebec. Mr. W. G. Brund, chemist, of Quebec, at that date, states as follows: "The whole family of balsam gatherers go into the woods in the Laurentine Mountains at a distance of from seven to ten miles from the villages. There they encamp for two months. The mother remains in the camp to do the cooking and to strain the balsam, and it is she who transports it in canisters of five gallons each, on her back to the villages, where she sells it at the rate of one dollar twenty cents a gallon in exchange for flour and pork, which she carries back to the camp. The father, with the boys, goes to pierce the trees, each furnished with a small can, with a tube proceeding from it at the top. The tube is of iron, sharpened, and with this portion of the instrument the blisters containing the oleoresin are pierced one by one, the liquid flowing down the tube till the vessel is full. (These blisters occur separately under the corky layer of the bark, the oleoresin not forming pockets in the wood, as in *Pseudotsuga Douglasii.*) The children mount the branches, whilst the father works on the lower part or trunk of the tree. A large tree will yield only about 1 pound of oleoresin, but on the average, the amount per tree is only about 8 ounces. A

father with two children may be able to collect a gallon of oleoresin between sunrise and sunset, but a man working alone has done a good day's work if he collects half a gallon. The 'balsam' cannot be collected when it rains, for the water dripping from the branches and running down the trunk renders it milky and unsaleable. The collection is made between June 15 and August 15 or September 1, when the snow usually begins to fall, and the balsam no longer flows. It is only the poorest inhabitants and the Indians who do this business. The largest crop ever gathered in one year was 5000 gallons. The trees should not be pierced two years running, and it requires two or three years before the second tapping, and then it aways yields much less than the first time." It will be readily understood, therefore, that Canada balsam, if genuine, must be much more expensive than Oregon balsam.

THE SCIENCE OF LIFE AND OF DEATH.*

It was a great saying of the celebrated Dutch-Jew philosopher Spinoza that "The free man thinks of nothing so little as of death; his meditation is not on death, but on life." The free man in Spinoza's sense is still a rare specimen of *Homo Sapiens,* so that for the mass of mankind death has not been robbed of its terrors, and, save for the young, to whom it seems a remote contingency, it is an ever-present shadow even in the brightest scenes of life. It is doubtless true, as Shakespeare tells us, that

> "The fear of death is most in apprehension.
> A beetle feels a corporal pang as great
> As when a giant dies."

But this philosophy affords little relief to the average human being, and even the teaching of Montaigne, that most sagacious of essayists, who in his essay on "Death" assures his readers that man passes out of life as painlessly and unknowingly as he enters it, or as he sinks into slumber when tired out at the end of the day's work, is not convincing. Modern thought demands something more positive than those consolations of philosophy which presuppose a philosophic capacity of which ordinary persons are destitute. Hence

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the appeal to science for a *rationale* of life and death. Until recently scientific research had failed to shed much light on what a certain school still characterizes as the "mystery of life," but the once fiercely agitated controversies between the Vitalists and the Abiogenesists have no real significance now, when bio-chemistry has revealed so much of the mechanism of living matter. There is always a point at which any explanation of natural phenomena ceases to explain, because the human mind cannot reach beyond ultimate reality. Short of this there is no "mystery" that science is not capable of elucidating. The study of the mechanism of living matter has been remarkably facilitated by the microbiological research and discovery with which the immortal names of Pasteur, Lister, and Metchnikoff must always be identified, and it is to Metchnikoff especially that we are indebted for the inspiring conception of the living organism as a battleground of opposing forces, namely, the conservative factors, in the form of the digestive cells or phagocytes, which are present in all living things from the most primitive up to the most highly developed species, and the microbic or toxic enemies to bioplasm, with which the phagocytes wage perpetual defensive warfare. As Metchnikoff and some of his predecessors proved, many protista and protozoa, which reproduce by the splitting up of the individual into two or more new individuals, are, strictly speaking, physically immortal, as in the process of division or subdivision it is impossible to say which is the older organism. For such species, therefore, there is no natural death, although there must often be accidental or catastrophic extinction of individuals. The hereditary substance, or germ-plasm of Weissman, is in the higher animals, the homologue of the unicellular immortals, but in this case the somatic or body substance of the individual perishes, and the personality passes, since the offspring are a mixed product of the inherited characters of parents, grandparents, or remoter ancestors. For the vast majority of species of metazoa, life is merely a trust for the benefit of posterity, so that the individual is of value only as a transmitter of the so-called life-force which Bernard Shaw has made the *primum mobile* of a new religion. One of Metchnikoff's most memorable researches had as its object the definite ascertainment of the causes of the "disharmonies" which shorten what he believed to be the normal duration of human life, and as readers of his work on "The Prolongation of Human Life" will

remember, he formulated the theory that human beings are aged prematurely, and many of them die before their natural term, because of the presence in the "intestinal flora" of toxin-producing bacteria, the products of which (phenols and indols) are absorbed into the blood-stream in such quantities and so constantly that the phagocytes are unable to cope with them, and tissue-degeneration sets in, the cells of the degenerate tissues in their turn being devoured by the phagocytes. Metchnikoff was at first confident that the introduction into the intestine, by means of food, of *lacto-bacilli,* and *Glycobacter peptonicus,* would inhibit the action of the putrefactive bacteria, and there can be no question whatever but that the sour-milk diet has proved most beneficial in many cases of intestinal indigestion, but, as Metchnikoff admitted later, the problem is a complicated one, and much more will have to be learned about the nature and action of the "intestinal flora" before a scientifically hygienic dietary can be devised. But if this can be done and other life-shortening conditions eliminated, we share Metchnikoff's optimism in anticipating that most microbe diseases can be prevented, if not entirely extirpated, so that in many cases death will come about naturally, as a result of the gradual ebbing of the sensorial and other activities which collectively constitute life. In this connection Metchnikoff sought to discover demonstrative examples of "natural death." The Ephemeridæ, or May flies, which are unable to feed themselves, were, as the name implies, too short-lived to enable him to determine to what precise cause their death was due, and the Rotiferæ, which also lack buccal organs, and cannot therefore take in food, were too small in size for physiological experiments, but in the case of the silk-moth, which was favorable for experimental purposes, Metchnikoff discovered that it was not hunger that caused death, since the moth subsists on the fatty substance which remains after the metamorphosis of the chrysalis into a moth, nor were there any indications of exhaustion, or of the presence of micro-organisms which might have caused death by infection. Metchnikoff was haunted by some misgiving on the latter point, as he suspected that microbes invisible even under the highest-power microscope might occur. But, apart from this reservation, the silk-moth seems to furnish an example of "natural death" such as, under appropriate hygienic conditions, might be vouchsafed to man. The problems as to the "instinct of life" or self-preservation,

and the "instinct of death" or what ought to be a natural desire for death, are psychological, but have a physiological basis. According to Metchnikoff, the desire or will to live is not so strong in the young as in persons of maturer years, but we are disposed to regard this as a personal view, rather than a sound generalization. Metchnikoff's early life and his scientific career as a young man in Russia, were embittered by perpetual struggle, and frequent disappointment. Later, in the congenial and inspiring environment of the Pasteur Institute, the pessimism begot of privation and frustration of effort, mellowed into a sane optimism with a keen zest for life, and the pursuit of science for the benefit of mankind. The outbreak of the world-war in 1914 was a shattering blow to Metchnikoff's faith in the stability and progress of civilization, but his optimism survived it, and after a torturing illness, he died firm in the persuasion that one day science will succeed in delivering humanity from the scourge of diseases, chiefly through prophylaxis and rational hygiene, and that there will also be a new science, the science of death, which will make it less hard to die. For in the case of human beings who survive to an advanced age, free from disease, and suffering only from slow progressive enfeeblement of body and of mind, there is generally an "'instinct of death." As the desire or will to live, and the interest in the advantages and pleasures that life has to offer lessen in force, the desire for the rest that death alone can give grows stronger, until the gently worn-out soul chants gladly its "Nunc dimittis." Far better this euthanasia than the agonies of death, which often make dissolution so terrible, even when it is prayed for by the victim and the witnesses of his or her torments. May this deliverance be the last and the greatest of the gifts of Science to mankind!

REPORT OF THE ONE HUNDRED AND FIRST ANNUAL MEETING OF THE PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE.

The annual meeting of the Philadelphia College of Pharmacy and Science was held in the Museum of the College on March 27, 1922, President Braisted in the chair.

Forty-six of the members present signed the roll, although the attendance numbered about sixty-five.

The minutes of the quarterly meeting, held December 27, 1921, were approved as read.

Under the head of unfinished business the resignation of Dr. R. P. Fischelis from membership on the Publication Committee was presented and upon motion of Mr. Peacock was accepted with expressions of regret that pressure of other duties prevented Dr. Fischelis from continuing as a member of this committee.

Mr. J. W. England, Chairman of the Special Committee on Constitution and By-Laws, presented the revision, which is printed elsewhere in this issue.

Affirmative action was taken upon each paragraph as read and a motion of Mr. England to adopt as a whole was unanimously carried.

Prof. F. P. Stroup in presenting the report of the Committee on College Membership stated that about six hundred new names had been added to the list of college members. The report, upon motion, was received.

No report was made by the Committee on Necrology.

The Committee on Publication of the AMERICAN JOURNAL OF PHARMACY in its report directed attention to the increased cost of publication incurred by the large increase in College membership and recommended an increase of $100 per month in the College appropriation for the use of this committee. The report was received and upon motion of Prof. LaWall the recommendation for an increase in the College appropriation was referred to the Finance Committee of the Board of Trustees for favorable action.

The Committee on Founder's Day Celebration, Prof. LaWall, chairman, reported that the celebration was held according to the proposed plan and was fairly successful as to attendance and very successful as to program and enthusiasm aroused.

A Special Committee on Future College Programme, Mr. B. T. Fairchild, chairman, presented the following report for the Board of Trustees:

"Gentlemen:

"Your Committee appointed, pursuant to Resolution of March 7, to prepare a statement of the development plan for the College, begs to submit the following report:

"A survey of the problems involved discloses three major topics which demand careful consideration as follows:

"First. The continuance and development of present facilities.

"Second. The determination of a permanent location.

"Third. Our possible contribution as a nucleus for the development of a National Institute of Pharmacological and Therapeutic Research, Practice and Teaching.

"The Committee wishes to call attention to plans formerly prepared by the Centennial Committee, under which it was intended to raise a substantial fund for the construction of modern buildings, etc.

"It is believed that the contract with Will, Folsom and Smith should be extended with a view to carrying on the drive for funds.

"We think it should also be noted that the final decision as to the location of the Delaware River Bridge will enhance the value and marketability of our present holdings and will adversely affect the character of this section of the city for our purposes.

"The Committee is especially impressed with the opportunity for co-operation whilst maintaining the independent integrity of our Institution, and feels strongly disposed toward recommending transferrence of its activities into a closer physical proximity to some larger educational institution whose courses may be exchanged or purchased by our institution from the other, thus enhancing and enlarging the opportunities of each.

"In reaching this opinion the Committee has been impressed by the danger to pharmacy of what is in effect detached vocational training, and by the benefits which would obtain if arrangements could be made under which medical students could come into closer contact with and a finer appreciation of the contribution to public health of which the pharmaceutical sciences are capable.

"Again in considering the possibility of the early establishment of a National Institute, your Committee has leaned strongly toward a location with adequate grounds for such an institute. Even without reference to the establishment of such a national institute our facilities should be very substantially increased. In fact, your Committee is advised that extension is needed at home for taking care of our higher classes, and we are confronted with the necessity of providing a new laboratory and a new class room for next year's work.

"The Committee is of the opinion that as soon as the College has made adequate provision for the continuation of its scholastic work, it would constitute the ideal 'central figure or activating agent' for the launching of the plants for the National Institute as proposed by Admiral Braisted.

"In conclusion the Committee's recommendations are as follows:

"First. That for the present, only such minor changes and additions be made in our present buildings as to satisfy the requirements of our existing courses. That the Faculty be immediately re-

quested to furnish the officers with recommendations for necessary changes within the next two years as far as they can be forecast at present.

"Second. That where possible a co-operative relationship with an institution that might be helpful be considered, and a site selected that will aid by proximity.

"Third. That at the proper time the campaign for the raising of funds shall be completed with the idea for providing for site, building and an endowment fund.

"Fourth. That a qualified committee be appointed at an early date to carry on the preliminary surveys and to formulate the necessary plans looking toward the establishment of a national institute, the idea in which our College has taken the initiative and in the realization of which it shall be essentially associated or the nucleus.

"Signed by

"B. T. FAIRCHILD (per C. H. LaWall),
"CHARLES H. LAWALL,
"SAMUEL P. WETHERILL, JR.,
"W. C. BRAISTED."

Upon motion of Prof. LaWall, seconded by Mr. Rohrman, the meeting unanimously approved the recommendations included in the report and urged the College officers and the Board of Trustees to take such steps as would meet in their opinion the requirements of the report.

President Braisted, in his annual report, gave a comprehensive review of the work accomplished during the first year of the second century of the existence of the College and stated that the outlook for the future was encouraging. Upon motion of Mr. Osterlund, the report was received and referred to the Publication Committee. The following abstracts from the interesting address call special attention to important phases of College program and progress:

"The closing of another year of our College history, the first of the new century, offers an opportunity for a brief review of its accomplishments and our plans.

"Coming to you about a year ago with an appreciation of the value of the profession of pharmacy through my experience in the navy, but without an intimate personal knowledge of the needs of pharmacy in general, it has been necessary to make a comprehensive study of the situation. An earnest effort has been made throughout the year to obtain the viewpoint of every division of pharmacy, and it is from this sympathetic background that plans are being made for the future.

"With a realization that under the most favorable circumstances it would be several years before new buildings and equipment could be provided for the College, attention was immediately given to the physical condition of the College property. Through the generosity of members of the Board of Trustees and friends, it was possible last summer to make many urgently needed repairs and improvements; so that upon the opening of the course last fall the physical condition of the present buildings was very much improved.

"On the educational side, the new Bachelor of Science courses were launched, with additions to the faculty to take care of the Language and Science courses, and additional assistants (nine in number), were also provided for the Laboratories, and several other departments, thus materially strengthening the teaching work.

"The entering class in September was large, almost 350, the total number of students registered for the Ph. G. course being 640. There were ninety-eight additional students registered for advanced courses, so that the facilities of the College were being used almost to their capacity.

"The large number of students already enrolled in the advanced courses compels the immediate consideration of our plans for new buildings and equipment and your Board of Trustees will place recommendations before you on this subject, representing the result of a year's careful study.

"During the autumn of 1921, through the generosity of the H. K. Mulford Co. the use of about 2½ acres of ground was acquired by the College near Glenolden, Pa., for the establishment of botanical gardens.

"Prof. Youngken was made director of these gardens and plans for their development are well under way.

"Ground was broken during October for the main garden and by early December twenty-eight beds and border beds were dug out and their borders sodded. The old Mulford Garden has been overhauled and with the completed main garden will contain plants arranged in beds according to families, which is in accordance with the scheme of botanical gardens connected with universities here and abroad.

"The year has been in many respects an unusual one, highly satisfactory in almost every way—with the expansion of our teaching staff and the gradual uplift for higher educational standards, the financial condition has been, and remains, fairly satisfactory. The introduction of a budget system has made for a safer and better conduct of affairs.

"The plans for the future seem reasonably bright, and it is hoped that not only may the teaching of pharmacy and its branches be vastly improved, but that the years to come will see this institution the centre of most important research work. The great demand today along these lines is for experimental therapy and the demand

is growing for some institution to take up this work. It is planned if possible to make the College, in addition to its strictly educational work, a centre or national institution of experimental and research therapeutic endeavor.

"It seems to me that our College should be the one institution to supply the need shown in this article, and the opportunity is ours now if we have the courage and strength to attempt it.

"For the future we seem to have determined the following things:

"1. The present site of the College must be changed for a better one—I think we are soon to have this site.

"2. That the effort to complete the raising of funds, for purchasing a new site, for building a new College and for endowment be actively pushed as soon as the time is considered propitious.

"3. The expansion of the College work to make it the leading institution in pharmacy and research work pertaining to therapeutics in this country.

"4. Co-operative union with the leading institutions of the city that wish our help and are willing to reciprocate to assist our needs.

"No more splendid opportunity could be presented to this institution than exists now—with every outlook for a successful undertaking and with the plans and resources being considered at the present time not alone by ourselves but by many powerful and interested factors that give every promise of completion within a few years.

"Let me urge you, therefore, to be awake to the progress of events in connection with the College and its future welfare, which seem to point to a career far beyond our most sanguine expectations."

Mr. Ivor Griffith, in the editor's annual report, pointed out that the number and quality of the contributions printed in the AMERICAN JOURNAL OF PHARMACY during the past year indicated that it was well maintaining its record of past years in the world of scientific periodicals.

The report of the Curator, Prof. H. W. Youngken, referred to the refurbishing and improved arrangement of the Museum and its contents, and bespoke the co-operation of members and friends of the College in building up a representative zoological collection, the most needed specimens including taxidermic mounts of birds and mammals and a good collection of insects and skeleta of vertebrates. The Curator acknowledged the receipt of forty-eight slides and case from the Pharmacy Department and three thousand shells of molluscs, presented by Dr. Githens.

Prof. Youngken reported the botanical gardens as being in good shape and acknowledged the receipt of a specimen of leprosy plant from the Bureau of Plant Industry at Washington.

The Librarian, Prof. F. P. Stroup, reported over one hundred accessions to the Library during the year, as well as the receipt of numerous publications issued by the various departments of the U. S. Government. Frequent use was made of the Library by students, Faculty, and the general public, and under the rules of the Inter-Library Loan, books and periodicals were sent to the U. S. Government, industrial establishments and various schools of pharmacy.

Mr. O. W. Osterlund, for the Legislative Committee, reported participation in a conference held in Washington, which was called to oppose the principle of releasing tax free pre-medicated alcohol for use in the manufacture of pharmaceutical preparations intended for internal use. On behalf for the College, the Legislative Committee opposed the plan, whether permissive or mandatory.

Mr. J. C. Peacock, in the absence of Mr. Thum, chairman of the Nominating Committee, presented the following report:

"March 13, 1922.

"To the Secretary of the Philadelphia College of Pharmacy and Science, Philadelphia, Pennsylvania.

"Dear Sir:

"In accordance with the By-Laws, the Committee on Nominations submits the following list of nominees, to be acted upon at the annual meeting, March 27, 1922.

President, William C. Braisted
First Vice President, Frank R. Rohrman
Second Vice President, Joseph L. Lemberger
Treasurer, Milton Campbell
Corresponding Secretary, Adolph W. Miller
Recording Secretary, Ambrose Hunsberger
Curator, Heber W. Youngken
Editor, Ivor Griffith
Librarian, Freeman P. Stroup

Trustees (four to be elected)

William D. Robinson
R. S. Sherwin
F. P. Streeper
Paul Kind

Publication Committee

Charles H. LaWall
Joseph W. England
John K. Thum
Heber Youngken
Julius Sturmer
E. Fullerton Cook

Committee on Pharmaceutical Meetings

Clement B. Lowe
Richard H. Lackey
Charles H. LaWall
John K. Thum
Heber W. Youngken

"(Signed)
"JOHN K. THUM, Chairman."

Mr. J. W. England stated that inasmuch as there was only one name placed in nomination for each office to be filled, he would, therefore, move that the Secretary be instructed to cast a ballot electing to the respective offices the nominees selected by the Nominating Committe. Seconded and unanimously carried. Mr. England then moved that the Secretary be instructed to cast a bollot electing to the Board of Trustees the nominees selected by the Nominating Committee. Seconded and unanimously carried.

Mr. Wetherill then moved that the Secretary be instructed to cast an unanimous ballot electing all the nominees. Seconded and unanimously carried.

Complying with these instructions, the Secretary cast a ballot for the complete list of nominees selected by the Nominating Committee, and the President thereupon declared them unanimously elected to the respective offices and membership upon the Board of Trustees—the officers to serve for one year and the members of the Board of Trustees each to serve three years.

Prof. E. Fullerton Cook presented resolutions endorsing the Sesqui-Centennial Celebration to be held in Philadelphia in 1926. Mr. S. P. Wetherill, Jr., moved that a committee with power to adopt be appointed to redraft the resolutions. This was seconded by Prof. Cook and carried.

The president appointed on this committee Messrs. Wetherill, Cook, LaWall, England and Dr. Robinson. This committee prepared and adopted the following resolutions:

WHEREAS, the spiritual, social and material progress achieved during the past one hundred and fifty years is in a large measure traceable to the religious, political and economic freedom consequent upon the signing of the Declaration of Independence; and

WHEREAS, the sacrifice not only of our men ancestors but those fired with zeal for human progress throughout the world have paved the way for a world-wide realization of the blessings which must result from the practice of these high principles; and

WHEREAS, it is believed that a more general understanding of the fundamental principles postulated in the Declaration of Independence will contribute toward the solution of present day world problems and stimulate untold creative possibilities toward world peace and co-operation.

NOW, THEREFORE, BE IT RESOLVED

That the Philadelphia College of Pharmacy and Science, founded in the City of Philadelphia One Hundred and One years ago, pledge to the City of Philadelphia, the Commonwealth of Pennsylvania, and the Nation, its full co-operation in any and every way possible to assist in the movement for a Sesqui-Centennial Exhibition; and

That the Trustees, Faculty and members of the Alumni Association, no matter where they be located throughout the world, pledge themselves individually and collectively to do anything in their power to bring to the City in Philadelphia, in 1926, the leading representatives of our profession; so that the world at large may profit by their conferences, exhibits and teachings; and

That a copy of this resolution be sent to the Mayor of the City of Philadelphia, Chairman of the Sesqui-Centennial Exhibition Association, and also be printed in the American Journal of Pharmacy for the benefit of all interested in Pharmacy.

Meeting adjourned.

AMBROSE HUNSBERGER,
Recording Secretary.

CONSTITUTION AND BY-LAWS OF PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE.

Adopted March 27, 1922.

CONSTITUTION.

ARTICLE I.

Name.

The name of the Corporation shall be the Philadelphia College of Pharmacy and Science as incorporated by Act of the Commonwealth of Pennsylvania approved March 30, 1822, and subsequently amended by decrees of the Court of Common Pleas No. 1 for the County of Philadelphia, and recorded on September 2, 1878, as the Philadelphia College of Pharmacy, and on May 5, 1920, as the Philadelphia College of Pharmacy and Science.

ARTICLE II.

Objects.

The objects of the Corporation shall be the advancement of Pharmacy and allied Sciences, and the promotion of correlated education and research.

ARTICLE III.

Members.

The College shall consist of Active Members, Corporation Members, Corresponding Members, and Honorary Members.

ARTICLE IV.

Officers and Manner of Election.

The officers of the College shall be a President, two Vice-Presidents, a Recording Secretary, a Corresponding Secretary, and a Treasurer, and their respective duties shall be assigned by the By-Laws.

The officers shall be elected annually at the stated meeting of the College in March, and any vacancy that may occur may be filled for the unexpired term by a special election held at the next stated meeting after the occurrence of such vacancy.

A Librarian, a Curator, and an Editor, shall be elected annually, also, at the stated meeting of the College in March, and any vacancy

that may occur may be filled for the unexpired term by a special election held at the next stated meeting after the occurrence of such vacancy.

ARTICLE V.

Board of Trustees.

The Board of Trustees of the College shall consist of twenty-four members, four of whom shall be elected each year at the stated meeting of the College in March, and four at the stated meeting of the College in September, for terms of three years each, and their duties shall be assigned by the By-Laws.

Any vacancy that may occur in the Board of Trustees may be filled for the unexpired term at any regular election of the College after such vacancy shall occur.

The President, the two Vice-Presidents, the Recording Secretary, the Corresponding Secretary, and the Treasurer, shall be *ex-officio* members of the Board of Trustees.

Thirteen members of the Board of Trustees shall constitute a quorum.

ARTICLE VI.

Business.

The right of voting or holding office and transacting business shall be vested solely with the active members.

ARTICLE VII.

Seal.

The College shall have a common seal.

ARTICLE VIII.

By-Laws and Rules.

The College may establish such By-Laws for its government and regulation as may be deemed necessary and proper.

BY-LAWS OF THE COLLEGE.

ARTICLE I.

President and Vice-President.

Section 1. The President, or in his absence, one of the Vice-Presidents, or in their absence, a president *pro tempore,* shall occupy

the chair at the meetings of the College, enforce the by-laws or rules, preserve order, and shall give the casting vote when necessary.

Sec. 2. He shall call a special meeting of the College at the request of any three members in writing, specifying the object of the meeting.

Sec. 3. He shall appoint all committees, unless otherwise provided for by the By-Laws; and shall sign the diplomas and certificates of the College.

Sec. 4. He shall confer the degrees at the annual Commencement of the College.

ARTICLE II.

Recording Secretary.

Section 1. The Recording Secretary shall keep correct minutes of the proceedings of the College, and preserve all documents belonging thereto that may come into his possession.

Sec. 2. He shall keep a correct list of the members of the College, with the dates of their election, resignation or death.

Sec. 3. He shall issue the notices for the meetings of the College at least one day previous to the time, and furnish the chairmen of all committees with a copy of the minute of their appointment.

Sec. 4. He shall prepare the minutes for publication in the AMERICAN JOURNAL OF PHARMACY, and by his signature attest the diplomas and certificates of the College.

ARTICLE III.

Corresponding Secretary.

Section 1. The Corresponding Secretary shall conduct and preserve the correspondence of the College with corresponding and honorary members, and scientific individuals and societies. It shall be his duty to reply to all such communications addressed to or regarding the College. He shall first submit such correspondence to the President for his approval, and the records thereof shall be presented at the stated meetings of the College.

ARTICLE IV.

Treasurer.

Section 1. The Treasurer shall receive and take charge of the funds of the College, and shall be bonded at the expense of the

College for the faithful performance of this trust. He shall supervise the issuing of all diplomas and certificates of the College; shall have the custody of the seal, and affix the same under direction of the College or the Board of Trustees.

Sec. 2. He shall collect all money due the College, and shall pay no money except on an order of the President, or the Chairman of the Board of Trustees, countersigned by the respective Secretaries of the College or Board, as the case may be.

Sec. 3. He shall present an annual report to the Board of Trustees at the stated meeting in September.

ARTICLE V.

Librarian.

Section 1. The Librarian, under the direction of the Committee on Library of the Board of Trustees, shall have charge of the Library, and shall present an annual report to the College at the stated meeting in March.

ARTICLE VI.

Curator.

Section 1. The Curator, under the direction of the Committee on Museum of the Board of Trustees, shall have charge of the Museum and Herbarium, and shall present an annual report to the College at the stated meeting in March.

ARTICLE VII.

Journal.

Section 1. There shall be published monthly a Journal to be called the AMERICAN JOURNAL OF PHARMACY, the issuance of which shall be under the direction of a standing committee of seven members, of whom the Editor shall be one, elected annually at the stated meeting in March, and known as the Committee on Publication.

Sec. 2. The Journal shall contain original papers, selections from scientific periodicals and books, editorials, reviews, transactions of the College and Board of Trustees, and such other matter as the Committee on Publication may deem desirable to publish.

Sec. 3. The Committee on Publication shall fix the subscription price of the Journal and the salary of the Editor, subject to approval by the College; shall employ necessary assistance; shall

keep an accurate account of all receipts and expenditures, and of stock on hand; shall adopt rules and regulations for the proper and successful management of the Journal, and shall present an annual report to the College at the stated meeting in March.

ARTICLE VIII.

Members and Committees.

Section 1. Any person approving the objects of the College as expressed in the Constitution, may be elected an Active Member.

Sec. 2. Any candidate for active membership must be proposed, in writing, by two members at a stated meeting of the Board of Trustees, and may be balloted for at the next stated meeting, and upon receiving the vote of two-thirds of those members present shall become a member of the College. If any proposed candidate for membership be defeated, the name of such candidate shall not be recorded in the minutes.

Sec. 3. Active members shall pay five dollars annually, in advance, from the date of election. After twenty-five payments of five dollars, the member shall become a Life member and the annual dues shall cease.

Sec. 4. Any Active member, or applicant for Active membership, who shall pay the sum of seventy-five dollars at one time, may be elected a Life member, and be exempt from all further payments of dues; and all such payments may be kept in a separate fund if desired, from which may be taken annually for the current expenses of the College, the sum of five dollars for each Life membership.

Sec. 5. Any firm, corporation or association approving the objects of the College as expressed in the Constitution, may be elected a Corporation member. Corporation members shall pay ten dollars annually in advance from the date of election.

A Corporation member shall have all the privileges of active membership, including the right of participation in the meetings and work of the College through a representative appointed by the firm, corporation or association, but shall have no right to vote or hold office; this shall not debar, however, any employee or member of a firm, corporation or association from individual membership and privileges.

Sec. 6. Any Active or Corporation member neglecting to pay the annual dues for two years after they are due, shall forfeit the

right of membership; reinstatement may be had upon reapplication and the payment of arrearages.

Sec. 7. No resignation shall be received from any Active member or Corporation member unless it be accompanied by a statement from the Treasurer that all arrearages have been paid and any certificate of membership issued has been returned or destroyed.

Sec. 8. Any person approving the objects of the College as expressed in the Constitution, and residing beyond the limits of the United States and dependencies, and of knowledge, skill and integrity, may be elected a Corresponding member of the College.

Sec. 9. No person residing in the United States or dependency shall be chosen a Corresponding member, nor shall any Corresponding member continue such after he or she has removed to and become a permanent resident of the United States or dependency, but may be elected an Active member upon application and the payment of the annual dues.

Sec. 10. Any person whose achievements in Pharmacy and Allied Sciences merit special recognition, may be elected an Honorary member of the College.

Sec. 11. All members shall be entitled to receive THE AMERICAN JOURNAL OF PHARMACY free of charge, unless one year in arrears for dues.

Sec. 12. All members shall have free access to the Library and Museum, subject to the rules and regulations governing the use of such departments.

Sec. 13. Corresponding and Honorary members shall have all the privileges of active membership, but shall be exempt from the payment of annual dues, and shall have no right to vote or hold office.

Sec. 14. Any member on paying five dollars shall be entitled to a certificate of membership, signed by the proper officers and sealed with the seal of the College; such member covenanting in writing to return said certificate to the College on ceasing to be a member.

Sec. 15. A member may be expelled from the College for sufficient cause, by a vote of three-fourths of the Active members present at a stated or special meeting, notice of the intention of the College to consider the subject of the expulsion of the member having been given at a previous meeting, but no member shall be expelled without having been notified and afforded the opportunity of being heard.

Sec. 16. A Committee on Necrology, consisting of three members, shall be appointed at the stated meeting in March, whose duty it shall be to report the deaths of members of the College with appropriate biographical notices.

Sec. 17. A Committee on Nominations shall be appointed annually at the stated meeting in March. This committee shall consist of five members, but not more than two of these shall be members of the Board of Trustees, and no member shall serve on this committee for more than two years consecutively.

It shall be the duty of this committee to report to the College at the semi-annual meetings, one or more names for each office to be filled, including Trustees. The Committee shall send to the Recording Secretary, at least two weeks prior to the date of the election, a list of the proposed nominations, and such list shall be sent to each member with the notice of the meeting.

Any five or more active members may propose a candidate or candidates by submitting to the Secretary, in writing, such proposition at least two weeks in advance of the meeting. All names so proposed are to be included in the list of nominations sent to members, and also, the names of the proposers.

In the event of the committee failing to submit nominations for any office the meeting shall nominate.

ARTICLE IX.

Board of Trustees.

Section 1. The Board of Trustees shall conduct the affairs of the College and make such By-Laws and Rules and Regulations, and do all such other proper acts as they may deem necessary for the government and support of the College, and also perform such duties as may be, from time to time, committed to them by the College, subject, however, to revision by the College at each stated meeting.

Sec. 2. The Board shall meet once a month, or more often, if necessary, by adjournments or upon the call of the chairman.

Sec. 3. The Board shall appoint such standing committees as may be essential for the conduct of its work, and specify the duties of such committees in their By-Laws; and shall appoint such special committees as may be necessary.

Sec. 4. The Board shall be entrusted with the election of members as specified in Article VIII of these By-Laws.

Sec. 5. The minutes of the Board of Trustees, or abstracts of the same, shall be read at the meetings of the College for approval or correction; but the reading may be dispensed with by unanimous consent.

ARTICLE X.

Meetings.

Section 1. The stated meetings of the College for the transaction of business shall be held quarterly, on the last Monday of March, June, September and December. If the time of a stated meeting occurs on a legal holiday, the meeting shall be held on the day following, unless determined otherwise at the previous meeting.

Sec. 2. Fifteen Active members shall constitute a quorum.

Sec. 3. As soon as a quorum shall appear, at or after the appointed time of meeting, the President, or in his absence, one of the Vice-Presidents, or in their absence, a President *pro tempore*, shall take the chair and call the meeting to order.

Sec. 4. The order of business at stated meetings shall be:

1. Members present noted by Secretary.
2. Delegates present noted.
3. Minutes read, corrected if necessary, and approved.
4. Minutes or abstracts of minutes of Board of Trustees read.
5. Unfinished and deferred business.
6. Business from the minutes of Board of Trustees.
7. Reports of Committees.
8. New business.
9. Adjournment.

ARTICLE XI.

Certificates.

Section 1. The College shall grant certificates to every class of membership when desired; and in the case of honorary membership the certificates shall be issued without cost to the recipient.

Sec. 2. The preparation and issuance of all certificates shall be under the control and direction of the Board of Trustees of the College, and the certificates when issued shall be signed by the President and attested by the Secretary under the seal of the College.

ARTICLE XII.

Amendments.

Section 1. Every proposition to alter or amend these By-Laws shall be submitted in writing at one stated meeting, and may be balloted for at the next stated meeting, when, upon receiving the votes of two-thirds of the members present, it shall become part of the By-Laws.

ARTICLE XIII.

Rules or Order.

Section 1. On all points of order not noted in these By-Laws, the College is to be governed by the established usages of similar bodies.

SCIENTIFIC AND TECHNICAL ABSTRACTS

ABSTRACTS OF CERTAIN PAPERS READ BEFORE THE 1922 MEETING OF THE AMERICAN CHEMICAL SOCIETY.

THE FEEDING OF NON-KETOGENIC ODD-CARBON FATS TO DIABETIC PATIENTS. By Max Kahn.—It is prohibitive to feed diabetic patients who have a very low carbohydrate tolerance even a moderate amount of natural fat because of the danger of inducing a severe ketosis which may prove fatal It was found that synthetic non-ketogenic odd-carbon fats could be fed in large quantities to such persons without inducing any acidosis, and that the nutrition of such individuals was improved. A study is now being made of the intermediate metabolism of these fats and their effect on all types of diabetic and normal individuals.

A LABORATORY DISINFECTANT SOLUTION TO DISPLACE MERCURIC CHLORIDE. By Harper F. Zoller.—Sodium hypochlorite solution furnishes a means of providing an efficient, economical and safe sterilizing agent for use in biological laboratories. In the preparation of the solution it is essential to maintain a sufficiently high hydroxyl ion concentration for maximum stability—about pH 10.5.

Solution containing about 0.15 per cent. available chlorine (0.32 per cent. sodium hypochlorite) will destroy the most persistent of micro-organisms within ten minutes.

THE DETECTION AND ESTIMATION OF INORGANIC ACTIVATORS IN COMMERCIAL RENNIN AND PEPSIN PREPARATIONS. By Harper F. Zoller.—An activator-free pepsin or rennin solution coagulates dialyzed milk with great difficulty at the optimum temperature (41° C.) for rennin action. The presence of calcium or magnesium ions accelerates the enzyme action and gives the coagulum its normal physical consistency. The differential between the rate of coagulation in dialyzed milk and in undialyzed milk furnishes a factor, which, when compared with a similar factor obtained from activator-free enzyme solution under the same set of conditions, furnishes a means of roughly estimating the quantity of activator or accelerator present.

INFLUENCE OF THE VITAMINE CONTENT OF A FEED ON IMMUNITY TO ROUP. By J. S. Hughes, L. D. Bushnell and L. F. Payne.—Chickens receiving a feed low in vitamine were much more susceptible to roup than those receiving a similar feed high in vitamines. Four pens, of twelve chickens each, received feeds varying in their vitamine content. One chicken from the pen receiving a feed high in vitamines, eight from the pen receiving a feed low in the fat-soluble vitamine, seven from the pen receiving a feed low in the water-soluble vitamine and nine from the pen receiving a feed low in both fat and water-soluble vitamine, died with clinical symptoms of roup or a disease similar to roup. All chickens were exposed to the roup infection by keeping infected chickens in the pens.

COW'S MILK VERSUS GOAT'S MILK AS A SOURCE OF THE ANTISCORBUTIC VITAMINE. By C. H. Hunt and A. R. Winter.—Four weeks before the experiment started two cows and three goats were placed on the same ration, consisting of equal parts of a grain mixture and alfalfa hay. Forty-four guinea pigs were divided into eleven lots of four each and were given a weighed daily amount of a basal ration consisting of rolled oats 69 parts, autoclaved alfalfa flour 25 parts, casein 5 parts and NaCl 1 part. All of the pigs received, with the exception of the control lot, in addition to the basal diet, a

measured amount of milk each day; one-half of the lots receiving cow's milk and the other half goat's milk. The amount of milk fed varied from 10-50 cc. in increments of 10 cc. The control lot died of scurvy in 26-30 days. The pigs receiving 10 cc. of cow's milk survived from 42-53 days, while the survival period of those receiving 10 cc. goat's was from 60-103 days. Up to a period of 90 days one death from scurvy occurred among the lot receiving 20 cc. Cow's milk, while no deaths from scurvy occurred among the pigs receiving 20 cc. goat's milk. There was a decline in weight of both lots receiving 20 cc. milk, but the decline was greater with those receiving cow's milk than with those receiving goat's milk. When the amount of milk fed daily was increased to 30 cc. or more no difference was noted between cow's and goat's milk as a source of the antiscorbutic vitamine (C).

Results Obtained by Feeding Breeding Gilts a Ration Low in Vitamine. By J. S. Hughes and H. B. Winchester.—Breeding gilts receiving a feed low in vitamin A and C developed no abnormalities during the first ten months. At this time they developed the eye trouble common to rats, rabbits, dogs and other experimental animals, and in addition to this they developed a nervous disorder manifested by a general inco-ordination accompanied by frequent convulsions. Two of the eight did not breed, two died during the latter part of the gestation period, two aborted a few days before they died, one farrowed dead pigs, and the last one has gone fourteen days longer than the normal gestation period. Gilts receiving five per cent. alfalfa as a source of their vitamine A showed no abnormalities. Five per cent. alfalfa did not furnish sufficient vitamine for normal reproduction as twenty-eight per cent. of the pigs farrowed by these sows were dead.

The Toxic Constituent of Greasewood (Sarcobatus Vermiculatus). By James F. Couch.—Greasewood is an important forage plant for sheep on the winter ranges in the west. It is common in the semi-arid, alkali valleys of the far western States, and, while it is extensively grazed, it has been found by Marsh, Clawson and Couch to be poisonous. Chemical examination of the edible portions of the plant showed that they contain a large proportion of oxalic acid and unusually large amounts of sodium and potassium salts.

Toxic alkaloids, glucosides, and saponins were absent and it was shown by experiments upon sheep that the poisoning is due to sodium and potassium oxalates. The leaves of the plant contain the largest proportion both of ash and of oxalic acid; in the stems most of the oxalic acid is combined as calcium oxalate.

HIGHER ALCOHOLS FORMED IN THE FERMENTATION OF SUGAR. By J. C. Swenarton and E. Emmet Reid.—Crude fusel oil, from the large scale fermentation of molasses with pure culture yeast, contains substances boiling above isoamyl alcohol even up to 270°. A quantity of the high boiling portion has been repeatedly fractioned in vacuum and the alcohol part of each fraction extracted by treatment with phtahlic anhydride. The alcohols obtained by saponification of the mono-alkyl phthalates boil up to 110° at 8 mm. and vary in density at 25° from 0.8007 to 0.9067. Some are optically active. They are being studied further with the hope of identifying the individual alcohols. The non-alcohol portions of the fractions boil up to 155° at 10 mm. and have densities at 25° from 0.80 to 0.90. Some are optically active.

FURTHER EXPERIMENTS ON THE ISOLATION OF VITAMINE. By Atherton Seidell.—The method as now used for the preparation of highly active vitamine fractions consists in heating fresh brewer's yeast mixed with water to about 90° c.; adsorbing the vitamine present in the filtered solution by means of English fuller's earth; extracting this latter with saturated barium hydroxide solution, and concentrating the extract after acidifying with sulfuric acid and filtering by rapid vacuum distillation.

More detailed experiments on the precipitation of the vitamine in these concentrated extracts by means of silver salts have shown that approximately one-third of the solids present unite with the silver salts to form insoluble silver compounds. About one-half of the total vitamine, as determined by feeding experiments on pigeons, is present in these insoluble silver precipitates and the other half remains in the filtrate. This unexpectedly large unprecipitable fraction of the vitamine raises the suspicion that the portion accompanying the silver precipitates may not be in chemical combination, but simply held by adsorption. Further studies of the silver precipitates and filtrates are in progress.

CORRESPONDENCE

EINBECK, THE BIRTHPLACE OF MORPHINE AND OF BOCK BEER.

Editor, A. J. Ph.

Sir: With much interest did I read your excellent editorial, "The Light in the Window at Einbeck" in the April A. J. Ph. Let us hope that it will act as an inspiration to pharmacists, especially the younger generation!

To my regret I notice that you use the old name *Eimbeck*, instead of the more correct name *Einbeck*, which was adopted when the village became a city in 1272. Einbeck is also the birthplace of the celebrated Bock Beer. This beer was first brewed in the fifteenth century and became known as "Einbeck Beer," which in time was simplified to "Bock Beer," a justifiable evolution, quite especially as *ein* (one) did not quite satisfy the thirst! In my address, "History of Beer" before the Long Island Drug Club at New York City, on March 17, 1913, I brought out this fact together with the statement that the great reformer, Martin Luther, was very fond of this Einbeck Bock Beer.

Now back from beer to morphine! Your editorial gives the wrong impression that Sertürner was proprietor of the apothecary shop at Einbeck. Friedrich Wilhelm Adam Sertürner learned pharmacy in the *Apotheke* at Paderbom, Westphalia, where he commenced his opium studies. In 1811 he became clerk in the apotheke in Einbeck, Hanover, where he continued his investigations. In 1820 he bought the apotheke in Hameln, where he died on February 20, 1841. In memory of the one hundredth anniversary of the discovery of morphine the Deutscher Apotheker Verein erected a tablet, properly inscribed, at the Hameln Apotheke.

Also permit me to call attention to the "miss" in your quotation of the award to Sertürner (last paragraph, page 220). The Institut de France, on June 27, 1831, after a thorough investigation, awarded the Monthyon Prix of 2000 francs to Sertürner *"pour avoir recomm la nature alcaline de la morphine et avoir ainsi ouvert une voie qui a produit de grandes déconvertes médicales."* Wooton, in his excellent "Chronicles of Pharmacy," vol. II, p. 245, also omits

this very important statement, *"alkaline,"* which won Sertürner the prize. Owing to the alkaline character of these plant bases the German apotheker Wilhelm Meissner, of Halle, coined the term "Alkaloid" in 1821.

I trust that you will pardon my "butting in" and will fully understand my motives, namely "More truth in pharmacy."

Respectfully,

OTTO RAUBENHEIMER, Ph. M.

Brooklyn, N. Y., April 19, 1922.

CORRECTION OF ERRONEOUS STATEMENT APPEARING IN MARCH ISSUE RELATIVE TO GOVERNMENT BULLETINS ON FRUIT FLAVORS.

Washington, D. C., April 4, 1922.

Prof. E. Fullerton Cook,
Philadelphia, Pennsylvania.

Dear Professor Cook:

In your interesting lecture as published in the March issue of the AMERICAN JOURNAL OF PHARMACY an incorrect statement has inadvertently been made which has given us considerable trouble. At the end of the article on page 167, after referring to the study of fruit flavors in the Bureau of Chemistry it was noted that "The results of this work is being published in a series of Government bulletins." No publications on this subject have either been issued or contemplated by the Government. You have doubtless had in mind the papers on the odorous constituents of the apple and the peach which were contributed by Power and Chestnut to the *Journal of the American Chemical Society* and published in the July, 1920, and July, 1921, issues respectively of that journal. As separates of such papers can only be procured at the expense of the authors they are not available for general distribution. A number of requests have already been received and many more may be expected for copies of Government bulletins on this subject and I would therefore be greatly obliged if you will kindly call attention in the JOURNAL to the error of statement.

Very truly yours,

FREDERICK B. POWER,
Pharmaceutical Research Chemist in charge,
Phytochemical Laboratory.

FROM THE SCIENTIFIC SECTION OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.—Fellow-workers in Pharmacy: In order to obtain a census of scientific pharmaceutical research and to stimulate further work, the following recommendations were adopted by the Scientific Section at its last meeting.

1. To ascertain the nature and extent of scientific work carried on by pharmacists, completed in 1921, and now in progress.

2. To urge workers to carry on at least one piece of constructive work dealing with scientific pharmacy and publish the original or an abstract in the *Journal of the American Pharmaceutic Association.*

We cannot accomplish our task without the co-operation of those who are in a position to give it.

Should the splendid *Bibliography of Pharmaceutical Research*, published monthly, be incomplete in any particular, give us the missing data.

Indicate the general nature of your studies in progress, so that duplication of work will be avoided, the scientific activity of pharmacists be more fully recognized, and new research be suggested.

Do your part in solving at least one problem connected with pharmaceutical research.

Prepare papers for publication and at least one paper for presentation at the forthcoming meeting in Cleveland.

We count on you for full support!

Fraternally yours,

ARNO VIEHOEVER,
Secretary.

HEBER W. YOUNGKEN,
Chairman.

NEWS ITEMS AND PERSONAL NOTES

ANNUAL CONVENTION OF THE AMERICAN PHARMACEUTICAL ASSOCIATION MEETS IN CLEVELAND, OHIO.—The seventieth annual convention of the American Pharmaceutical Association will meet in Cleveland, Ohio, during the week of August 14th. The convention will be held between the dates of the fourteenth and twentieth.

This will be the first time the convention has met in Cleveland for fifty years. In other words, it is the golden anniversary.

The headquarters will be at the Hotel Statler, which is located in the very heart of Cleveland and within five or ten minutes' walk of all the principal hotels and all the major business houses. Plans have been perfected with the hotel whereby mailing cards will be sent to every member of the association. These cards will carry the hotel rates, and when the hotel receives the return card the room will not only be reserved, but assigned to the individual, and he will be notified of his room number, so that his room will be ready for him when he appears. There will be no other convention in the Statler Hotel during this week. It will devote its entire energy to entertaining our association.

Plans have been partially perfected to date for a splendid entertainment program, as well as that of the business sessions.

The National Association of Boards of Pharmacy and the American Conference of Pharmaceutical Faculties will both meet at the same time.

There will be a report of the committee on reorganization of the association, that will be received and discussed at this convention. This may mean much or little but doubtess there will be some considerable discussion upon the plans, as many new ideas have been coming to the front recently as to the function of the A. Ph. A. in American pharmacy. The House of Delegates of this body will present its first report upon co-operative work with the State associations; and it is planned to keep a representative in Washington to look after the association's interests.

ENGLISH CHEMISTS' EXHIBITION TO MEET IN JUNE.—The twenty-third Chemists's Exhibition will be held at the Central Hall, Westminster, London, S. W., on June 19-23 next, and any member of the American drug, chemical and sundries trade will be welcomed and entertained on presentation of business card.

NEW BULLETIN ON SEROBACTERINS.—We have recently seen a copy of the latest edition (the fifth) of Mulford Working Bulletin No. 18, on the subject of "Serobacterins."

The text is illuminated with several diagrams and charts, which are very helpful in conveying a clear idea on some of the points and

advantages claimed for these products. There are also a number of authoritative reports, covering both experimental results on laboratory animals and clinical results in actual practice, together with a comprehensive bibliography, suggestions for dosage, etc., all calculated to prove interesting and helpful to the medical and pharmaceutical professions.

Copies of this new bulletin may be had by addressing H. K. Mulford Company, Philadelphia, Pa., and mentioning this publication.

The officers of the H. K. Mulford Company entertained Dr. H. S. Rusby, Director of the Mulford Biological Exploration of the Amazon Valley, at luncheon at the Manufacturers' Club, Philadelphia, on Friday, March 17.

To paraphrase Kipling, Dr. Rusby has indeed "lived more stories during his brief sojourn in South America than any novelist could invent in a lifetime," and graphically recounted his experiences, hardships, etc, all .of which were tinctured with the regret that on account of ill health he was compelled to abandon the expedition and delegate the leadership to other hands.

In addition to the officers and executives of the Mulford Company there were present a number of their district representatives who had been called to Philadelphia for an intensive course of instructions in the laboratories and to meet Dr. Rusby. These included—

M. K. Baird, Chicago; E. V. Clark, Minnesota; E. H. Long, Dallas; W. G. Stoll, Buffalo; F. C. Humphries, Florida; George Wilkes, Memphis; C. E. Greiner, Kansas City; E. A. Monell, St. Louis; W. T. Ellis, Ohio.

PROFESSOR H. V. ARNY TO RECEIVE REMINGTON HONOR MEDAL.—Announcement has just been made that the 1922 Remington Honor Medal has been awarded to Prof. H. V. Arny. This makes the third medal awarded; Dr. John Uri Lloyd and Professor James H. Beal being the recipients of the first and second medals respectively. The medal is awarded annually by a committee consisting of the Past-Presidents of the American Pharmaceutical Association, the

Secretary of the New York Branch acting as Secretary for this committee.

The actual award of the medal will take place at a banquet tendered to Prof. Arny by the New York Branch and will be held at the Hotel Pennsylvania on the evening of May 15. Dr. Diner, the Senior Past-President of the Branch will make the award. Various phases of Dr. Arny's activities which resulted in the award of the medal will be related by speakers who have been in close contact with the recipient of the medal during his years of true service to American pharmacy.

H. K. Mulford Company Distributors for Mercurophen. —It may interest our readers to know that the H. K. Mulford Company have completed arrangements with the Dermatological Research Institute of Philadelphia to distribute Mercurophen, a superior mercurial germicide.

Mercurophen was developed by Drs. Schamberg, Kolmer and Raiziss and introduced by them in 1917.

Clinical data and information will be furnished on application to the Mulford Laboratories.

N. Y. Q. Take New Offices.—The New York Quinine & Chemical Works, Inc., one of the oldest concerns in the industry, have been compelled by pressure of business to occupy new business quarters.

On April 22d the general New York office was removed from 135 William Street to 152-154 William Street. Mr. T. R. L. Loud, Vice-President and General Manager, will continue in charge as for so many years hitherto.

The new quarters are commodious and handsome, and are admirably suited for the quick and efficient dispatch of business.

Buyers, dealers and others who have occasion to come to New York are cordially invited to make the N. Y. Q. offices their headquarters during their visit. The many acquaintances of Mr. Loud will, as always, find the word "welcome" on the doormat.